REPORT OF A STUDY OF THE STATE HIGHWAY SYSTEM OF CALIFORNIA

BY THE

HIGHWAY ADVISORY COMMITTEE

1925

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OF A

Study of the State Highway System

OF

CALIFORNIA

BY THE
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P✓✓ Sacramento 1925

(arr. by
vehicle
type)

✓✓✓ 111p. tables maps
✓✓✓✓ Includes "Taxes on motor vehicle operation for all states" App. J
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(See Pocket Inside Back Cover.)

REPORT TO THE GOVERNOR BY HIGHWAY ADVISORY COMMITTEE.

February 20, 1925.

HONORABLE FRIEND WM. RICHARDSON,
Governor, State of California.

SIR: Your committee, appointed February 2, 1924, in accordance with chapter 241, Statutes of 1923, to make a study of the state highway situation for the purpose of rendering a report to you for the benefit of the forty-sixth session of the legislature, with the sole instruction that the members of the committee should perform their duty according to law, herewith submits its final report.

INTRODUCTORY.

The findings and recommendations of the Committee are summarized at the end of the report, and appendices are attached containing supplementary information referred to.

The act under which the Highway Advisory Committee was appointed is attached as Appendix A.

The duties of the committee as set forth in section 2 of the act include the following:

1. Making a complete study of the whole state highway situation.
2. Investigation of the general location of each of the several units of the state highway system whether constructed or unconstructed.
3. Investigation as to whether the various highways in the system should be paved or otherwise improved.
4. Investigation as to the advisability of eliminating any roads from the system.
5. Investigation as to the necessity of adding any roads to the present system.
6. Recommendation as to the best methods of outlining a proper system of state highways.
7. Investigation of methods of obtaining revenues for construction and recommendation of a plan.
8. Recommendation as to the rate at which the state highway system can be constructed and the time which will be required to bring it to a state of completion.
9. Recommendation as to such other matters as may be incidental to those herein stated.

Under the authority vested by the act, the Governor appointed the Highway Advisory Committee, consisting of seven citizens of the state to act in conjunction with a member of the California Highway Commission, and the State Highway Engineer. The following is a list of the members of the committee as appointed, showing also their respective places of residence, callings and official connections:

Arthur H. Breed, Piedmont, member of the Senate of the State of California, real estate.

Elmer P. Bromley, Los Angeles, member of the Assembly of the State of California, attorney.

George G. Radcliff, Sacramento, president, State Board of Control, newspaperman.

Louis Everding, Arcata, member of the California Highway Commission, lumberman.

Robert M. Morton, Sacramento, State Highway Engineer.

E. E. East, Los Angeles, chief engineer, Automobile Club of Southern California.

Arthur E. Loder, San Francisco, chief engineer, California State Automobile Association.

J. B. Gill, San Bernardino, banker and former county road commissioner.

J. H. Newman, Dinuba, farmer and former chairman county board of supervisors.

The committee met at Sacramento, March 6, 1924, and organized by electing Arthur H. Breed, chairman. W. F. Mixon, the secretary of the California Highway Commission, was selected by the committee to serve as its secretary.

The members devoted the larger portion of their time to the work of the committee for a period of approximately one year.

The committee, as a whole, traveled by automobile over the entire state highway system, and many of the additional roads advocated by various organizations for addition to the system. A complete study of the whole state highway situation was made both in the field and in the offices of the California Highway Commission, and many public meetings were held in all parts of the state. Conferences were held with the county boards of supervisors and various civic organizations.

In the absence of any appropriation for salaries or expenses, the work was carried on by the members of the committee without employment of any outside technical or clerical assistants.

Special studies in the engineering, economic and financial features of the problems were made by the engineers of the committee, and at their request much data and many reports were prepared by the engineering organization of the California Highway Commission.

Under date of January 21, 1925, the committee submitted a preliminary report signed by eight members summarizing its recommendations.

The various questions considered by the committee are taken up in order under the subdivisions following.

CREATION AND GROWTH OF THE STATE HIGHWAY SYSTEM.

The first official recommendation for the establishment of a system of state highways was made in 1896 by the Bureau of Highways, which proposed a system of 4500 miles, the construction of which was then estimated at an average of approximately $3,000 per mile. The history of this attempt, which finally failed to become a law, will be found in Appendix B, which deals with the road situation prior to 1909.

The California state highway system as it exists today was created and subsequently added to by direct votes of the people and various legislative enactments, resulting in a system of 6400 miles, which is estimated to be 9.3 per cent of the total mileage of public roads reported within the state in 1922.

INCEPTION OF STATE HIGHWAY SYSTEM—FIRST BOND ISSUE.

The California highway system, for the purpose of this study, had its beginning in 1909 with the passage of the first highway bond act, for $18,000,000, ratified by popular vote at the general election in 1910. The highways were to be "so laid out and constructed or acquired as to constitute a continuous and connected state highway system running north and south through the state, traversing the Sacramento and San Joaquin valleys and along the Pacific coast by the most direct and practicable routes, connecting the county seats of the several counties through which it passes and joining centers of population, together with such branch roads as may be necessary to connect therewith the several county seats lying east and west of such state highway."

This general plan as finally laid out included 3052 miles of road, and formed the nucleus or backbone and framework of the state highway system.

Under this bond issue the California Highway Commission was organized and proceeded to lay out and construct the system so far as funds would go. In response to the popular demand for pavements, the roads were for the most part surfaced with fifteen feet of concrete, four inches thick. The work was carried on under very favorable price conditions, but the funds were only sufficient to make a good beginning on the roads then in the system.

SECOND BOND ISSUE.

The expenditure of the first bond issue was immediately followed by the passage of a second bond act in 1915 voted by the people in 1916, providing $12,000,000 for the completion of the original system and an additional $3,000,000 to be used in cooperation with counties for certain additional and lateral roads, which, under the terms of the second bond act, were added to the highway system. These additions aggregated 702 miles.

By this time the idea of state roads built at state's expense had become popular and the proponents of additional state roads had found the occasion of refinancing by bond issue an opportune time for adding new roads.

Owing to the inflation of construction costs and the disturbing influences of the war, no appreciable financial contribution was made by any of the counties during the life of this bond issue, towards the construction of the additional roads, and first the $12,000,000, and later the $3,000,000, was absorbed by the construction necessities on the augmented system of state highways.

THIRD BOND ISSUE.

In 1919 the need for still more money for the state highways became an issue, and with the assistance of citizens' committees from all over the state, acting in cooperation with the state legislature and the State Highway Commission, a $40,000,000 bond issue was proposed and passed, half of which was to be devoted to completion of all of the roads included in the first and second acts and the other half to be devoted to 31 additional roads aggregating 1853 miles brought into the system by the third act.

Although the roads added to the system at this time, as in the previous case, were in most instances meritorius, they were not generally of so much statewide importance as the original trunk line system of roads, which were still far from completion. The entire amount of the bond issue could have been well used in completing the original system. On the other hand, its entire amount of $40,000,000 would have been insufficient to build the mileage of new roads added to the system by this bond act.

LEGISLATIVE ACT ROADS.

From time to time, before and since the passage of the first bond act, the legislature has created as state highways certain other roads, which for the purpose of this report we term "legislative act roads." For the most part, these roads are located in the mountainous sections of the state, particularly across the Sierras in the territory lying east of San Joaquin, Sacramento and Placer counties. Some of these roads were subsequently named in the bond acts, and such sections are, therefore, included in the mileage of road listed under the various bond issues. Eliminating these sections, however, there are 793 miles of legislative act roads in the present state highway system.

TOTAL HIGHWAY SYSTEM 1924.

The tabulation on the opposite page summarizes the total existing state highway system, which has steadily grown from the initial 3052 miles until it has more than doubled in extent in a period of fourteen years.

The pocket map accompanying this report shows the general location of each of the sections comprising the 6400 miles in the system.

GENERAL LOCATION OF UNITS OF THE SYSTEM.

Comments on the general location or distribution of the various units of the state highway system are found in other parts of this report under the subjects of "Classification," "Financing" and "Apportionment of Funds."

In most cases, the general location of routes between termini is fixed by natural topography and the feasibility of construction. Routes remaining to be built should be placed on the most direct and practicable location, considering the purpose to be served, the cost of construction and the practicability of future maintenance.

It is fortunate that all of the bond acts have empowerd the Highway Commission to locate the highways on the most direct and practicable routes and it is recommended that all future enabling acts contain this provision.

There is uncertainty surrounding the designation and general location of the county seat lateral to Quincy. The first bond act authorized a county seat lateral from the Valley highway to Quincy "by the most direct and practicable route." The third bond act added the Feather River Canyon road from Oroville to Quincy, thus creating a situation which has resulted in no construction on either route. Because of the very great difference in the estimated cost of the two routes thorough consideration on the part of the Highway Commission will be required prior to any construction.

AUTHORITY TO RELOCATE.

We find in viewing the problems involved in reconstruction of highways, the cost of which is defrayed from existing revenues, that there are a few places where a complete new location of certain sections of a highway would be more economical or better serve state traffic than reconstruction on the existing line. Too great an amount of local influence in location, errors in judgment as demonstrated by the lapse of time and the gradual development of higher standards to safely carry increased traffic have each in isolated cases rendered obsolete existing locations.

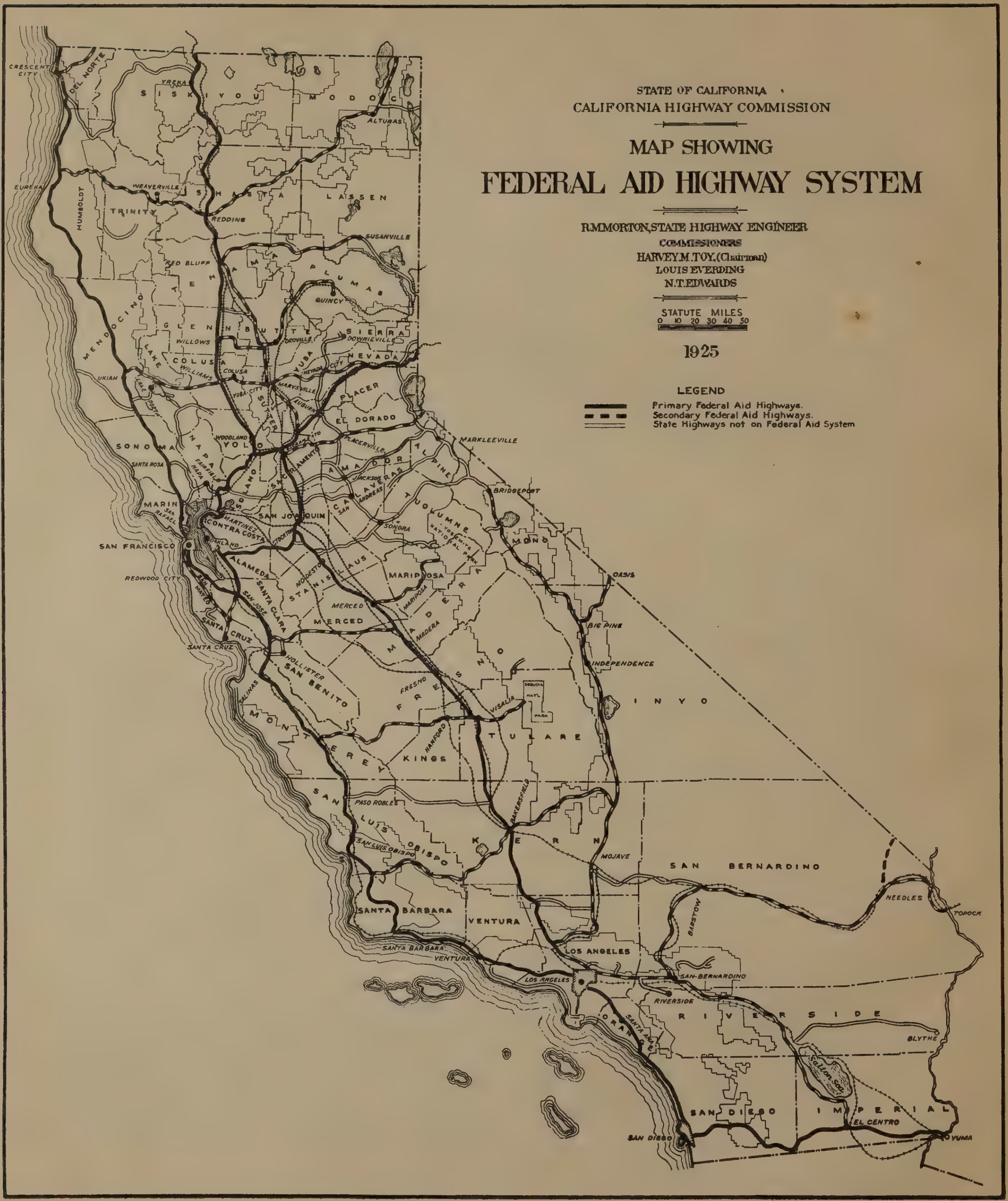
The State Highway Commission should have definite authority, through provisions of the revenue acts to relocate and realign roads at the time of reconstruction. This should carry with it the authority for abandoning sections of state highway which would be no longer usable, and which would revert to the county upon abandonment. Our present laws are not flexible in regard to these details.

We, therefore, *recommend that the present law be so amended as to give the California Highway Commission authority to relocate and realign constructed roads.*

LIST OF STATE HIGHWAYS AS OF DECEMBER 31, 1924, SHOWING LENGTH AUTHORIZED BY VARIOUS ACTS.

Route No.	Description	Total miles	Authorized by			
			First Bond Act	Second Bond Act	Third Bond Act	Legislative acts
1	San Francisco to Oregon Line	405	363		42	
2	San Francisco to San Diego	500	500			
3	Sacramento to Oregon Line via Marysville	308	308			
4	Sacramento to Los Angeles (Valley Route)	358	358			
5	Stockton to Santa Cruz via Oakland	117	117			
6	Sacramento to Woodland Junction	15	15			
7	Tehama Junction to Benicia	154	154			
8	Ignacio to Cordelia via Napa	38	38			
9	San Fernando to San Bernardino	57	57			
10	San Lucas to Sequoia National Park	147	13	100	34	
11	Sacramento to Nevada Line via Placerville	104	46		10	48
12	San Diego to El Centro	114	114			
13	Salida to Route 23 at junction	131	49			82
14	Albany to Martinez	22	22			
15	Route 1 near Calpella to Route 37 near Cisco	180	9		171	
16	Hopland to Lakeport	19	19			
17	Roseville to Nevada City	40	40			
18	Merced to Route 40 near Sequoia	75	39	31		5
19	Route 9 west of Claremont to Riverside	18	18			
20	Redding to Route 1 near Arcata via Weaverville	157	48	109		
21	Route 3 near Richvale to Quincy via Feather River	90	7		83	
22	San Juan Bautista to Route 32 via Hollister	15	7		8	
23	Saugus to Route 11 at Alpine Junction	440	340			100
24	Route 4 near Lodi to Route 23 near Silver Creek	89	37			52
25	Nevada City to Downieville	46	46			
26	San Bernardino to El Centro	149		149		
27	El Centro to Yuma	58		58		
28	Redding to Nevada Line via Alturas	175	147			28
29	Red Bluff to Nevada Line via Susanville	159	107		52	
30	Oroville to Quincy (abandoned)					
31	San Bernardino to Barstow	77		77		
32	Route 4 near Califa to Route 2 near Gilroy	84		84		
33	Route 4 near Bakersfield to Paso Robles	94		94		
34	Route 4 near Arno to Route 23 at Pickett's Junction	106	34			72
35	Peanut to Kuntz	31				31
36	Downieville to Mt. Pleasant	6				6
37	Auburn to Nevada Line near Verdi	99			77	22
38	Meyers to Nevada Line via Truckee River and Tahoe City	67			34	33
39	Tahoe City to Nevada State Line at Crystal Bay	12				12
40	Route 13 near Montezuma to Route 23 near Mono Lake	69				69
41	General Grant Park to Kings River Canyon	20			20	
42	Saratoga Gap near Redwood Park to Bloom's Mill	20				20
43	San Bernardino end county pavement to Bear Lake	51			13	38
44	Boulder Creek to Redwood Park	8				8
45	Willows to Route 3 north of Biggs	30				30
46	Route 1 near mouth of Klamath River to Route 3 at Klamath River Bridge	189			189	
47	Orland to Chico	17			17	
48	Route 1 near McDonald's to mouth of Navarro River	51			51	
49	Calistoga to Lower Lake	31			31	
50	Rumsey to Lower Lake	25			25	
51	Santa Rosa to Shellville	23			23	
52	Tiburon to Alto	5			5	
53	Fairfield to Lodi via Rio Vista	55			21	34
54	Near Michigan Bar to Central House	9			9	
55	San Francisco to Route 5 near Glenwood	61			61	
56	Carmel to Cambria	108			98	10
57	Santa Maria to Freeman via Bakersfield and Walker's Pass	212			212	
58	Mojave to Needles via Barstow	240			240	
59	Lancaster to Bailey's	37			37	
60	Oxnard to San Juan Capistrano	103			103	
61	La Canada to Mt. Wilson Road via Arroyo Seco	25			25	
62	Azusa to Pine Flats in San Gabriel Canyon	28			28	
63	Big Pine to Oasis	41			41	
64	Mecca to Blythe	92			92	
65	Auburn to Sonora	87			1	86
66	Manteca to Route 5 near Mossdale School	4				4
67	Pajaro River to Route 2 near San Benito River Bridge	3				3
	Totals	6,400	3,052	702	1,853	793
*68	San Francisco to Santa Clara County Line (Bayshore Highway)	26				26

*Authorized to be taken over as State Highway after construction by local authorities.


STATE OF CALIFORNIA
CALIFORNIA HIGHWAY COMMISSION
MAP SHOWING
FEDERAL AID HIGHWAY SYSTEM
R.M.MORTON, STATE HIGHWAY ENGINEER
COMMISSIONERS
HARVEY M. TOY, (Chairman)
LOUIS EVERDING
N.T. EDWARDS
STATUTE MILES
0 10 20 30 40 50
1925
LEGEND
Primary Federal Aid Highways.
Secondary Federal Aid Highways.
State Highways not on Federal Aid System
SISKIYOU
MODOC
DEL NORTE
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
GLENN
BUTTE
SIERRA
NEVADA
COLUSA
LAKE
YUBA
SUTTER
PLACER
EL DORADO
SONOMA
NAPA
YOLO
SOLANO
SACRAMENTO
AMADOR
ALPINE
CALAVERAS
TUOLUMNE
MARIN
SAN JOAQUIN
CONTRA COSTA
ALAMEDA
SAN FRANCISCO
SAN MATEO
SANTA CLARA
SANTA CRUZ
STANISLAUS
MARIPOSA
MONO
MERCED
MADERA
SAN BENITO
FRESNO
INYO
MONTEREY
KINGS
TULARE
SAN LUIS OBISPO
KERN
SANTA BARBARA
VENTURA
LOS ANGELES
SAN BERNARDINO
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL
CRESCENT CITY
YREKA
ALTURAS
EUREKA
WEAVERVILLE
REDDING
SUSANVILLE
RED BLUFF
QUINCY
WILLOWS
OROVILLE
DOWNIEVILLE
NEVADA CITY
COLUSA
WILLIAMS
UKIAH
LAKEPORT
YUBA CITY
MARYSVILLE
AUBURN
WOODLAND
SACRAMENTO
PLACERVILLE
MARKLEEVILLE
SANTA ROSA
FAIRFIELD
NAPA
JACKSON
SAN ANDREAS
BRIDGEPORT
SAN RAFAEL
MARTINEZ
STOCKTON
SONORA
YOSEMITE NATIONAL PARK
OAKLAND
REDWOOD CITY
SAN JOSE
MODESTO
OASIS
MERCED
MARIPOSA
BIG PINE
SANTA CRUZ
HOLLISTER
MADERA
INDEPENDENCE
SALINAS
FRESNO
SEQUOIA NAT'L PARK
VISALIA
HANFORD
PASO ROBLES
BAKERSFIELD
SAN LUIS OBISPO
MOJAVE
NEEDLES
TOPOCK
BARSTOW
SANTA BARBARA
VENTURA
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
SANTA ANA
BLYTHE
Salton Sea
EL CENTRO
SAN DIEGO
YUMA

UNDERLYING IDEA OF REVENUE ACTS.

Perusal of the second and third bond acts, supplemented by field study of the highways, indicates that the legislative intent has always been the completion of the system of highways as originally laid out. It is in view of your committee that in 1910 the counties of the state entered mutually into a joint agreement, one with another, to construct a trunk system of intercity roads and county seat connections. The main issue, however, has in some respects become clouded by the later inclusion of additional roads, either by direct legislative action or by one of the subsequent bond acts.

We do not hold the opinion that these highways of the first bond issue are now the only important highways. The wording was so framed that a start could be made in the building of a main trunk line state highway system, by providing for a nucleus of important roads.

RELATION OF STATE AND FEDERAL AID HIGHWAY SYSTEMS.

The map of the California federal aid highway system on the opposite page shows the roads of the state which have been officially included in the federal aid highway system of the United States by authority of an act of Congress under which the Secretary of Agriculture and the California Highway Commission agreed upon the roads to constitute the federal aid highway system in this state.

Under the federal law, this system can not be greater in extent than 7 per cent of the total public road mileage of the state of record in the office of the California Highway Commission in 1921. The system as established includes approximately 4493 miles. The maximum which could be included would be 4900 miles, or 1500 miles less than the total existing state highway system.

A comparison of the federal aid and state highway maps shows that the federal aid system includes most of the roads in the existing state system. It also includes a few sections of road which are not now state highways. These were required by the federal authorities in order to make continuous interstate highway connections and answer the requirements of the federal aid highway system of the United States. The sections in the federal aid system, but not at present state highways, include the following:

Crescent City to the Oregon line via Coast route;
Alturas to the Oregon line near New Pine Creek;
Oasis to the Nevada state line;
A connection from the Needles-Barstow road to the Nevada state line en route to Las Vegas, Nevada; and
A section of road from Needles to the Arizona state line at Topock.

SEVEN PER CENT FEDERAL AID HIGHWAY SYSTEM.

Primary Roads—(Federal Aid Classification.)

Route	Description	Miles
1	Oregon Line near Chetco to San Francisco	382
2	San Francisco to San Diego	500
3–7	Oregon Line to near Davis	282
4	Sacramento to Los Angeles	358
12–27	San Diego to Yuma	172
17–37–38 14–6–7–3–	San Francisco to Verdi	211
5	San Jose to French Camp	84
	Total mileage primary roads	1,989

Secondary Roads—(Federal Aid Classification.)

9–26	San Fernando to El Centro via San Bernardino	206
31–58	San Bernardino to Arizona Line at Topock via Barstow	258
58	Near Goffs to Nevada Line	25
63	Big Pine to Nevada Line	47
29	Red Bluff to Susanville	107
21	Richvale Junction to Quincy	90
3	Roseville to Red Bluff	117
23	Saugus to Bridgeport	340
55	Skyline Boulevard	61
5	San Jose to Santa Cruz	33
32	Gilroy to Califa	84
18	Merced to Yosemite National Park	70
15–17	Ukiah to Cisco	183
28	Redding to Alturas	147
	Alturas to Oregon Line	44
20	Redding to Arcata via Weaverville	157
45	Willows to 3 miles north of Biggs	30
11	Sacramento to Nevada Line via Placerville	104
10	San Lucas to Sequoia National Park via Visalia	147
1	Oregon Line, near Monumental to Crescent City	42
57	Santa Maria to Freeman via Bakersfield	212
	Total mileage secondary roads	2,504
	Total primary and secondary roads	4,493

FUNDS FOR CONSTRUCTION.

The funds available for use by the California Highway Commission for construction purposes have come from the three bond issues, legislative appropriations, federal aid post road apportionments and actual donations, principally by the counties.

The construction status of the highway system has also been materially advanced by direct expenditures by the counties and by those federal forest road construction projects which were located upon the state system.

Each of these factors in financing the work will be considered in order.

BOND FUNDS.

Funds realized from sale of three bond issues.

Year	Par Value	Premiums	Total
First issue (1910)	$18,000,000	$2,129	$18,002,129
Second issue (1916)	15,000,000	25	15,000,025
Third issue (1919)	40,000,000	1,332,250	41,332,250
Totals	$73,000,000	$1,334,404	$74,334,404

FEDERAL AID FUNDS.

Federal aid funds from various appropriations by Congress have been apportioned to the credit of California in the following amounts:

For fiscal year ending	Apportionment
June 30, 1917	$151,063 92
June 30, 1918	302,127 84
June 30, 1919	1,980,415 53
June 30, 1920	2,896,071 77
June 30, 1921	3,054,675 51
June 30, 1922	2,462,098 53
June 30, 1923	1,641,399 02
June 30, 1924	2,140,463 10
June 30, 1925	2,464,990 78
Total apportionments	$17,093,306 00

Federal aid received to June 30, 1924	$9,461,376 47
Under specific agreement	2,333,158 32
Negotiated for specific allotment	2,541,182 16
Total liabilities to June 30, 1924	$14,335,716 95
Balance available June 30, 1924, for allotment to specific projects	2,757,589 05
Total apportionment	$17,093,306 00
Total collected by state to June 30, 1924	9,461,376 47
Balance as of date June 30, 1924, to become due from government as work progresses	$7,631,929 53
Between July 1, and December 31, 1924, additional collections were received by the state in amount of	2,167,337 59
Balance as of date December 31, 1924, to become due from government as work progresses	$5,464,591 94

This balance will be collected slowly over the next few years as federal aid projects now under way are completed and as the remainder of the fund is placed under specific agreement on new projects and ultimately collected after such new projects are completed.

It is probable, but not an assured fact, that Congress will continue to make appropriations for federal aid on approximately the same scale as for the last fiscal year shown above. It is doubtful if the amount of annual appropriation will be increased materially for some years.

California's apportionment out of each such appropriation is fixed by a percentage factor based on the relative area, population and mileage of roads over which mail is carried in the various states. Therefore our proportion will not change materially.

The amount of federal aid coming to the state will bear no relation to our increasing traffic problem as expressed in the rapidly mounting motor vehicle registration.

LEGISLATIVE APPROPRIATIONS.

Various appropriations have been made by the legislature for road construction and in a number of cases for surveys of roads which never became part of the state highway system.

Out of such appropriations made available to the Highway Commission, there were expended on the present highway system a total of $576,540.67 to June 30, 1924.

FOREST HIGHWAY FUNDS.

The total of federal aid, section 8 and federal forest highway funds apportioned to California to and including the fiscal year ending June 30, 1925, inclusive, for forest roads amounted to $4,879,646.87. Only a portion of this is allotted to roads on the state highway system, the remainder going to roads of importance to the national forests. All of such funds are expended by or under the direction of the United States Bureau of Public Roads, subject to the approval of the Highway Commission, and are not handled by the state. Out of these funds there had actually been expended by the government on sections of the state highway system to June 30, 1924, an amount of $2,315,866.

COUNTY CONTRIBUTIONS.

Cash contributions from the various counties have added the surprising amount of $1,425,087.32 to state highway expenditures from the beginning of the project to June 30, 1924. On that date an additional amount of $238,000 was under agreement to be paid by counties on account of work finished or under way.

The majority of these jointly financed projects include bridge construction or paving within the limits of small towns and are indicative of the willingness of local communities to encourage, by substantial offers of financial aid, the early construction of projects of importance to them.

EXPENDITURES OF COUNTIES ON STATE HIGHWAY SYSTEM.

County	Rights of way and fences	Bridges and structures	Miscellaneous	Total	Interest on State Highway Bonds	Loss on State Highway Bonds	Grand total
Alameda	$7,552 50	$105,126 45		$112,678 95	$148,364 57	$13,925 00	$274,969 32
Alpine		1,000 00		1,000 00			1,000 00
Amador	20,308 66	20,247 64		40,556 30			40,556 30
Butte	40,545 95	250,123 97		290,669 92	33,670 00	7,750 00	332,089 92
Calaveras	2,101 50	13,424 05	$3,473 73	18,999 28	16,099 29		35,098 57
Colusa	32,000 00	89,370 00		121,370 00		31,463 68	152,833 68
Contra Costa	15,088 68	9,485 03		24,573 71			24,573 71
Del Norte	20,015 53	7,000 00		27,015 53			27,015 53
El Dorado	7,119 00	16,357 54	59 50	23,536 04			23,536 04
Fresno	900 00	73,861 61		74,761 61			74,761 61
Glenn	5,685 40	96,504 00		102,189 40	72,504 74		174,694 14
Humboldt	210,741 55			210,741 55	227,270 66	990 71	439,002 92
Imperial	3,400 00	93,798 67		97,198 67			97,198 67
Inyo	18,095 92			18,095 92	19,959 50	5,190 00	43,245 42
Kern		161,312 82		161,312 82			161,312 82
Kings	1,600 00	45,013 22		46,613 22	23,014 50	5,478 00	75,105 72
Lake	16,543 81			16,543 81	5,992 08		22,535 89
Lassen	15,415 51	55,438 81		70,854 32			70,854 32
Los Angeles	62,983 30	337,025 03		400,008 33			400,008 33
Madera	7,440 68	33,989 76	508 20	41,938 64			41,938 64
Marin	11,424 24	55,980 33		67,404 57			67,404 57
Mariposa		2,200 00		2,200 00		2,000 00	4,200 00
Mendocino	85,715 59	126,532 66		212,248 25			212,248 25
Merced	5,394 16	138,255 94		143,650 10			143,650 10
Modoc	29,683 32	13,975 00		43,658 32			43,658 32
Mono	568 20			568 20			568 20
Monterey	47,560 00	158,550 00		206,110 00			206,110 00
Napa	47,499 00	73,613 50		121,112 50		7,237 00	128,349 50
Nevada	22,495 89	64,976 65		87,472 54			87,472 54
Orange	40,952 66	190,284 19		231,236 85			231,236 85
Placer	31,330 00	60,490 00		91,820 00		16,780 00	108,600 00
Plumas			No expenditures				
Riverside	23,519 37	196,922 78		220,442 15			220,442 15
Sacramento	2,184 80	558,900 00		561,084 80			561,084 80
San Benito	10,894 50	101,174 00	15,374 45	127,442 95			127,442 95
San Bernardino	3,800 00	72,720 00		76,520 00			76,520 00
San Diego	10,001 41	113,456 86		123,458 27			123,458 27
San Francisco	29,000 00			29,000 00			29,000 00
San Joaquin	12,000 00			12,000 00			12,000 00
San Luis Obispo	25,595 38	267,846 30	4,396 11	297,837 79			297,837 79
San Mateo	19,173 00			19,173 00			19,173 00
Santa Barbara	50,497 00	581,720 00	1,619 00	633,836 00	285,859 00	33,900 00	953,595 00
*Santa Clara	15,000 00	30,000 00		45,000 00	5,000 00		50,000 00
Santa Cruz	7,470 00	42,959 32		50,429 32			50,429 32
Shasta	21,302 00	83,966 00		105,268 00	190,454 66	8,000 00	303,722 66
Sierra	1,002 50	18,620 90	1,416 62	21,040 02	18,959 98		40,000 00
Siskiyou	30,055 26	116,188 60	20 00	146,263 86	110,047 09		256,310 95
Solano	25,068 42	37,854 82	2,283 04	65,206 28			65,206 28
*Sonoma	100,000 00	175,000 00		275,000 00	50,000 00		325,000 00
Stanislaus	7,273 69	152,781 44	1,000 00	161,055 13		45,177 00	206,232 13
Sutter	14,284 01			14,284 01			14,284 01
Tehama	22,238 00	585,683 00	10,000 00	617,921 00			617,921 00
Trinity	4,937 00			4,937 00			4,937 00
Tulare		187,246 91		187,246 91			187,246 91
Tuolumne	11,824 00	18,376 28	4,967 73	35,168 01	34,230 60	1,029 62	70,428 23
Ventura	5,750 00	280,534 43		286,284 43			286,284 43
Yolo	56,243 87	56,408 57		112,652 44	135,418 00		248,070 44
Yuba	6,588 00	183,672 00		190,260 00			190,260 00
Totals	$1,325,863 26	$6,155,969 08	$45,118 38	$7,526,950 72	$1,376,844 67	$178,921 81	$9,082,717 20

*Estimated.

COUNTY EXPENDITURE ON STATE HIGHWAY SYSTEM.

Before designation as state highway, a large mileage of road has been paved by counties, as shown in the following tabulation:

STATE HIGHWAYS INITIALLY PAVED BY COUNTIES.

BOND ACT ROADS.

COUNTY	MILES
Alameda	8.6
Kern	41.7
Kings	9.4
Los Angeles	65.7
Marin	1.2
Monterey	1.9
Riverside	9.7
Sacramento	57.7
San Benito	7.0
San Bernardino	38.4
Santa Barbara	15.2
San Joaquin	61.1
Solano	.4
Tulare	28.6
Ventura	2.6
Total bond act roads	349.2

LEGISLATIVE ACT ROADS.

Sacramento	6.1
San Joaquin	17.5
Total legislative act roads	23.6
Grand total	372.8

It is safe to estimate the average original cost to be $10,000 per mile. This has served to materially extend the mileage of pavement on the state highway system. It has been equivalent to a donation estimated at $3,728,000.

Your committee has assembled records of expenditures made by the counties incidental to state highway construction since 1912. A summary is shown below:

Rights of way and fences	$1,325,863 26
Bridges and structures	6,155,969 08
Miscellaneous	45,118 38
Total	$7,526,950 72
Interest on state highway bonds before change in law	1,376,844 67
Loss on state highway bonds purchased by counties when not salable at par	178,921 81
Grand total county contributions	$9,082,717 20

The foregoing amounts do not include the actual cash contributions paid by counties to the State Highway Commission for expenditure under its direction. The total of such contributions is elsewhere shown.

The details of county expenditures incidental to state highway construction are shown on the preceding page.

TOTAL STATE HIGHWAY INVESTMENT TO JUNE 30, 1924.

The following summary shows the total investment or expenditures by state, counties and federal government in the California state highway system to June 30, 1924:

HIGHWAY INVESTMENT.

Reference	Item	Amount
Semi-annual report 1.	Bond funds	$69,346,856 13
Semi-annual report 2.	Special legislative appropriations	576,540 67
Semi-annual report 3.	Federal aid	9,239,215 97
Semi-annual report 4.	County contributions	1,425,087 32
From foregoing text 5.	Federal forest road construction	2,315,866 00
From foregoing text 6.	Expenditures by counties for 372.8 miles pavement (estimated)	3,728,000 00
From foregoing text 7.	Other expenditures reported by counties	9,082,717 20
Total investment to June 30, 1924		$95,714,283 29

This tabulation does not include expenditures for reconstruction and betterment from motor vehicle funds.

CONDITION OF CONSTRUCTION FUNDS DECEMBER 31, 1924.

The following statement shows the condition of the construction fund account to the close of business December 31, 1924:

Sale of three bond issues, including premiums	$74,334,404 00
Legislative act, Chap. 223, Klamath bridge	225,000 00
Federal aid collections deposited in the funds of the three bond issues	11,364,309 00
County cash contributions deposited in the funds of the three bond issues	1,431,140 14
Total deposited in construction funds to close of December 31, 1924	$87,354,853 14
Total expenditures on construction	84,101,551 63
Total balance on hand December 31, 1924, available for construction	$3,253,301 51

This balance is obligated on the going contracts; therefore, the remaining asset at the disposal of the State Highway Commission is entirely federal aid.

As of December 31, 1924, there remained an additional asset in the unused portion of federal aid funds thus far apportioned to California as follows:

Federal aid under agreement or negotiated for specific projects	$3,037,078 23
Federal aid available but not allotted to specific projects	2,427,513 71
Total remaining federal aid assets to be collected in the course of two years or more	$5,464,591 94

The exhaustion of construction funds shows the necessity for refinancing construction, if we are ever to complete the roads now in the state highway system.

INADEQUACY OF PAST CONSTRUCTION FUNDS.

Analysis of the three major financing operations of the past, to wit: the three bond issues, in conjunction with the mileage of roads added on each occasion, clearly shows why it has not been possible to fully complete the state highway system of today with the funds heretofore available.

The total bond sales and premiums, amounting to $74,334,404, if they could have been used uniformly over the entire 5607 miles of bond issue roads, would have provided an average of $13,257 per mile, whereas it is found that construction on the standards now required costs above $40,000 per mile, and on especially difficult sections has reached as high as $100,000 per mile for short stretches.

The following tabulation is only one of the various analyses of the situation which may be made:

In this analysis it is assumed:

1. That the first bond funds could be used only on the roads of the first bond issue.

2. That $12,000,000 of the second bond issue would be used on the roads of the first bond issue and $3,000,000 on the roads added by the second bond issue.

3. That $20,000,000 of the third bond issue, plus premiums, would be used uniformly over the roads of the first and second bond issues; and

4. That $20,000,000 of the third bond issue, plus premiums, would be used uniformly over the roads added by the third bond issue.

While these assumptions are not strictly correct, the tabulation is of interest, showing the total average funds which might be regarded as available per mile for the roads in each of the authorization groups established by the three bond issues.

The foregoing analysis does not include federal aid funds or county contributions, which fortunately became available as elsewhere detailed.

ANALYSIS OF BOND FUNDS SHOWING AVERAGES PROVIDED PER MILE.

	First bond issue, roads			Second bond issue, roads			Third bond issue, roads		
	Miles	Amount, including premiums	Average per mile	Miles	Amount, including premiums	Average per mile	Miles	Amount, including premiums	Average per mile
First issue	3,052	$18,002,129	$5,898						
Second issue		12,000,020	3,932	702	$3,000,005	$4,273			
Third issue		*16,801,550	5,505		*3,864,575	5,506	1,853	$20,666,125	$11,153
Totals and average	3,052	$46,803,699	$15,335	702	$6,864,580	$9,779	1,853	$20,666,125	$11,153

*Prorated according to mileage.

RECAPITULATION.

Bond issue, roads	Miles	Amount	Average per mile
First issue	3,052	$46,803,699	$15,335
Second issue	702	6,864,580	9,779
Third issue	1,853	20,666,125	11,153
Totals and average	5,607	$74,334,404	$13,257

CONSTRUCTION STATUS JUNE 30, 1924.

The general extent and location of construction as of date June 30, 1924, is shown on the pocket map attached to this report.

The tabulation below shows the construction status of the state highway system to June 30, 1924. The line of mileages showing paving and the line showing grading by the Highway Commission include projects completed or under actual contract on this date. They are included in order to arrive at the remaining mileage to be financed.

The line of mileages showing no construction or partially constructed indicates the work remaining to be financed from new funds.

The table shows separately the miles of road on the state highway system paved by the counties. All mileages are segregated according to the authorization subdivisions of the highway system or the various acts creating the system.

On some of the constructed mileage, cooperation has been received from national forest road funds allotted for improvement of roads through the national forests.

A study of the tabulation indicates that the Highway Commission has devoted the larger portion of the funds at its disposal to the completion of the roads of the first bond issue.

As the map shows, no trunk highway has thus far been completed to a bordering state.

It was proper that the most important centers of population should first be connected, but now that this part of the undertaking has been substantially advanced, it becomes urgent that the major interstate connections should be constructed.

CONSTRUCTION STATUS STATE HIGHWAY SYSTEM, TO JUNE 30, 1924.

Highway Commission Construction Mileages Include Projects Completed or Under Contract.

The Mileages Remaining to Complete Must Be Financed from New Funds.

Authorized by Act	First Bond Act, roads	Second Bond Act, roads	Third Bond Act, roads	Total bond acts	Legislative Act, roads	Total
Total mileage	3,052	702	1,853	5,607	793	6,400
Miles paved by California Highway Commission	1,728	265	81	2,074	3	2,077
Miles graded and gravel or rock surfaced by California Highway Commission	753	207	378	1,338	28	1,366
Miles paved by counties	222	70	57	349	24	373
Miles no construction expenditure by California Highway Commission	349	160	1,337	1,846	738	2,584
Miles partially constructed but requiring further expenditure to complete	784	221	279	1,284	9	1,293
Total mileage to complete	1,133	381	1,616	3,130	747	3,877

TRAFFIC.

There is little record prior to the 1920 count of traffic on the state highways. In 1922 the Bureau of Public Roads again, acting with the State Highway Commission, made a complete traffic study. In 1924 further counts were made by state highway forces covering two consecutive days of sixteen hours each at intervals of two months at 266 stations simultaneously all over the system.

There was a general increase in traffic at all stations between 1920 and 1922 of 47 per cent. The increase in automobile registration during this same period was 53 per cent.

The 1924 traffic studies indicate a general average increase at all stations throughout the state of 43 per cent over 1922, during which time there has been a further increase in automobile registration of 51.5 per cent. It can be predicted that traffic on state highways will in general follow with reasonable closeness the increase in motor vehicle registration.

The map on the following page shows by width of cross-hatched line platted to scale the relative density of traffic on all parts of the state highway system for a sixteen-hour count taken June 15, 1924.

It should be noted that the scale of platting the traffic density is reduced more than one-half in the heavy traffic areas where it exceeded 5000 vehicles. It is there shown in solid black.

This map shows at a glance where the heaviest maintenance and reconstruction expense may be expected and where the greatest widths of surfacing will be called for.

The influence of the centers of population on the highway and traffic problem is clearly evident. A map showing distribution of population will be found in a following section on "Apportionment of Funds" and is of interest in the present connection showing the influence of population distribution on traffic distribution.

It must be borne in mind at the same time that the relative condition of a road has a material influence on the amount of traffic it draws. For this reason we may expect that future traffic density maps will be modified to some extent by the location of future road improvement which will open up and tend to popularize other lines of traffic, especially in recreational territory.

Traffic count stations which consistently show exceptionally heavy traffic, or are of interest in consideration of some of the through lines of travel, are listed herewith.

TRAFFIC COUNTS AT TWENTY SELECTED STATIONS ON HEAVILY TRAVELED SECTIONS OF STATE HIGHWAY SYSTEM.

Sixteen-Hour Count, Sunday, June 15, 1924.

Route No.	Station	Count June 15, 1924	Peak count on other dates
1	Redwood Highway at junction Tiburon road	5,945	
1	Redwood Highway south of Eureka	4,189	
2	Peninsula Highway at San Bruno junction Bay Shore road	27,577	
2	Peninsula Highway at Stanford University entrance	14,995	
2	Coast Route, Santa Barbara south of city	5,858	
2	Coast Route, Hollywood at Lankershim Boulevard	19,348	20,347
2	Whittier Boulevard, east city limits of Los Angeles	21,763	27,873
2	Los Angeles-San Diego road at northerly city limits of Anaheim	12,416	15,700
2	Los Angeles-San Diego at San Juan Capistrano	4,578	
3	Sacramento, north of city at American River bridge	10,829	
3	Pacific Highway south of Yreka	1,421	1,526
4	Valley Route at Modesto, north of city	4,410	
4	Valley Route at Fresno, south of city	6,938	
4	Ridge Route, at maintenance station	1,854	2,371
5	Altamont Pass road, Altamont at R. R. station	3,829	
5	Dublin Canyon road at junction Niles road	5,149	
5	Los Gatos-Santa Cruz road southwest of Los Gatos	6,821	
9	Pasadena, east city limits	14,787	
9	Foothill road, San Bernardino, west of city	5,364	
14	San Pablo Avenue at Richmond junction	13,453	

These counts taken on a heavy travel day show the traffic congestion, which is now a seriously vital problem on the main highways leading into some of the cities of the state.

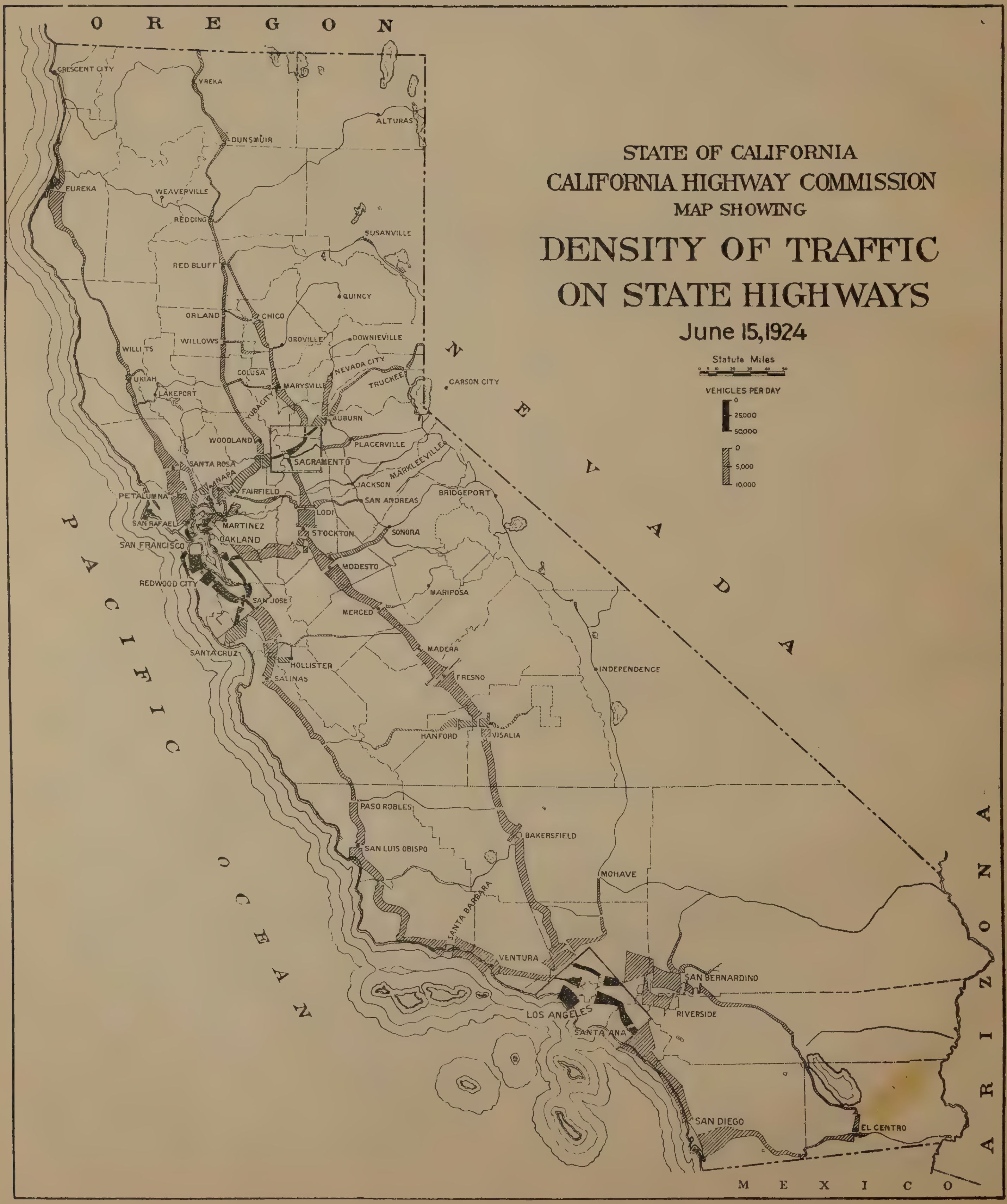
On such days as represented by these counts some of the city entrances are so jammed with vehicles that several hours are required to move as much as twenty miles. This is the peak traffic caused by week-end and recreational travel.

On some of the roads travel has increased to such an extent as to crowd to the point of danger to any except experienced drivers on normal week days, and the end is not in sight.

The extent to which a given volume of travel crowds or endangers traffic on a road is determined fully as much by the character and safety of alignment as by width of pavement.

For example, most drivers and passengers would very much prefer to risk a trip on the Coast road south of Santa Barbara on a big traffic day with 5858 vehicles than on the Ridge route with 1854 vehicles. The Coast road at this point is paved, for the most part, only 15 feet wide and has reasonably good alignment, whereas the Ridge route is paved 20 feet wide but has such crooked alignment as to be hazardous except for a limited volume of travel. Both roads seriously need improvement to increase capacity.

The Los Gatos-Santa Cruz road, carrying 6821 vehicles on a 15-foot pavement with a very crooked mountainous location, is a case where peak traffic far exceeds safe capacity already reduced by severe curvature.



MAINTENANCE.

The maintenance of the state highways has grown to an undertaking of magnitude because of the light nature of most of the early construction work, and because of the great increase in number and weight of vehicles. Funds are expended for maintenance upon all of those sections where construction has been performed, and upon all sections paved by counties which have been accepted as state highways. Maintenance has been extended by the Highway Commission to some of the important unbuilt sections on main line roads which carry heavy traffic.

In 1924, the Highway Commission reports 4622 miles under maintenance. For 1925 they report that 4918 miles will be under maintenance. The increase is due to the completion of additional sections of highway and the policy of extending maintenance to important unbuilt roads.

Detailed information regarding the mileage and character of highways under maintenance is shown in the following table:

MILEAGE OF STATE HIGHWAYS UNDER MAINTENANCE BY THE CALIFORNIA HIGHWAY COMMISSION, JUNE 30, 1924.

	Miles	Div. I	Div. II	Div. III	Div. IV	Div. V	Div. VI	Div. VII	Div. VIII	Div. IX	Div. X
Bond Issue Roads constructed or improved by the California Highway Commission:*											
Earth	308	60	61	-------	-------	-------	50	39	8	81	9
Rock surface	656	196	181	68	70	54	3	-------	9	15	60
Asphalt macadam	144	9	-------	47	12	3	49	-------	16	8	-------
Portland cement concrete	1,598	30	105	239	174	232	265	275	151	8	119
Asphaltic concrete on macadam	63	-------	-------	-------	27	1	-------	-------	33	-------	2
Asphaltic concrete surface on Portland cement concrete	236	-------	-------	6	72	25	52	48	2	-------	31
Miscellaneous	6	-------	-------	-------	-------	-------	-------	1	5	-------	-------
Totals	3,011	295	347	360	355	315	419	363	224	112	221
Bond Issue Roads taken over but not rebuilt. (Includes county built roads):											
Asphalt macadam	172	-------	-------	26	7	11	-------	43	17	-------	68
Portland cement concrete	87	-------	-------	4	-------	2	40	20	18	-------	3
Asphaltic concrete on macadam	27	-------	-------	-------	3	10	13	-------	-------	-------	1
Asphaltic concrete surface on Portland cement concrete	3	-------	-------	-------	-------	-------	1	1	-------	-------	1
Totals	289	-------	-------	30	10	23	54	64	35	-------	73
Legislative Act Roads Under Maintenance, but not improved under bond issues:											
Earth	748	-------	52	251	28	13	15	-------	38	62	289
Rock surface	47	-------	37	9	-------	-------	-------	-------	-------	-------	1
Asphalt macadam	18	-------	-------	-------	-------	-------	-------	-------	-------	-------	18
Portland cement concrete	5	-------	-------	-------	-------	-------	-------	-------	-------	-------	5
Totals	818	-------	89	260	28	13	15	-------	38	62	313
Built by U. S. Government (taken over for maintenance):											
Earth	13	-------	13	-------	-------	-------	-------	-------	-------	-------	-------
County roads maintained but not taken over as State Highway:											
Earth	448	121	63	-------	-------	-------	-------	-------	223	41	-------
Rock surface	31	21	10	-------	-------	-------	-------	-------	-------	-------	-------
Asphalt macadam	12	-------	-------	-------	-------	-------	-------	-------	12	-------	-------
Totals	491	142	73	-------	-------	-------	-------	-------	235	41	-------
Grand totals	4,622	437	522	650	393	351	488	427	532	215	607

*Includes roads being maintained before construction is completed.
*Seventy-one miles of forest roads, classed as constructed, are not under maintenance.

During 1924 the Highway Commission reports an average expenditure of $619 per mile for general maintenance, which does not include "minor betterments."

Owing to the magnitude and importance of this work, it is being handled as a separate department of the highway organization. Maintenance work in general includes repairs to pavement, base and surface, the maintenance of earth or rock shoulders at the side of the pavement, the maintenance of drainage and the removal of slides, the maintenance of structures and bridges, the maintenance of trees planted along the roadsides.

Miscellaneous work in the maintaining of guard rails, signs, etc., is also done by this department, which handles in addition the detail work of approving and issuing permits for encroachments on state highway rights of way, or for temporary disturbance of improvements on the part of individuals. The Highway Commission has set up a system to regulate necessary encroachments on state highways, under the provisions of the Statutes of 1915, chapter 400, page 642.

The class of expenditure known as "minor betterments" includes incidental construction on highways open to traffic, which increase the serviceability and safety of the highways, such as guard rails, occasional widening of small bridges and structures, improvement to local drainage conditions, removal of obstructions to sight, placing of rock and gravel on earth shoulders, acquisition of maintenance stations and facilities, and the repair of entrances from private and intersecting roads. This class of work is never complete, and the cost of a certain amount of this nature of improvement must be met each year. It is the kind of work which gives more immediate results in the safeguarding of life and property than any other expenditure on the highways, and it should be increased as the funds permit.

The above tabulation shows 4622 miles under state maintenance. This leaves 1778 miles now in the system receiving no maintenance by the state, and in most cases very little, if any, from counties. Many unbuilt sections of main highways of the first, second and third bond acts are in no better condition than when introduced into the state system.

On about 400 miles of roads of the first bond issue the people in the vicinity who, in good faith, voted for the bonds have been waiting fourteen years for some form of state highway service on their roads, and still it is in the future. The same thing applies, but for a less time, on a larger mileage of roads of the second and third bond issues.

These sections of the state are entitled to as much highway service as can be economically justified.

During the past year the State Highway Commission has demonstrated in a number of emergency cases, especially on interstate connections, that excellent road service can be furnished by the constant and systematic upkeep given by their trained maintenance organizations, even on old county roads previously regarded as very poor. Their modern equipment keeps the road smooth, while the width is gradually increased and the sharp turns cut off. Gravel, fine crushed stone or selected local material is applied in the worst places and travel is kept moving on a smooth, comfortable road. This has been done at a comparatively small cost per mile per year.

We are informed by the State Highway Commission that the additional annual cost to extend this class of work to those roads not now maintained is estimated from $600,000 to $700,000 per annum.

We, therefore, recommend that maintenance be extended by law to all unconstructed state highways open to travel, this for the reason that many years will elapse prior to construction of all the state highways, and the best possible road service should in the interim be furnished.

It should be realized, however, that the assumption of additional maintenance responsibilities by the state will be defrayed out of the revenues now provided. To the extent that such additional maintenance is undertaken, the amount available for reconstruction will be reduced. We trust, however, that in the gradual annual increase of those revenues will be found a solution of this problem.

See section of this report on "Funds for Maintenance and Reconstruction" for estimate of future requirements for maintenance.

RECONSTRUCTION.

It has wisely been decided by the legislature that the state's portion of the funds accruing from issuance of motor vehicle licenses and from the gas tax should be used only for maintenance and reconstruction of state highways.

We have found throughout the state a pressing need for the widening, straightening and strengthening of highways already built.

The Highway Commission is devoting the balance of the annual revenues provided by the acts above described, after maintenance requirements are provided for, to the most imperative reconstruction work. To January 1, 1925, 622 miles of either state or county improved roads on the state highway system had been rebuilt. Our inspection of the state highway system convinces us that a large amount of this class of work will always be required.

Your committee has made no attempt to select sections of state highways which are in immediate need of reconstruction, but at the request of the committee there has been prepared by the highway engineering organization an estimate including the sections which, in their opinion, should be reconstructed during the next five years. The estimate shows that at least $65,000,000 could properly be expended on needed work within that time. This figure is in addition to the requirements of general maintenance and minor betterments, which will increase annually, as new roads are constructed, and as motor vehicles increase in number.

The type of work performed under the classification of reconstruction is expensive, on account of the fact that the condition of those sections to which reconstruction funds are allocated and the traffic to be accommodated are often such as to require the building of practically a new road to standards far in excess of the original construction. The average cost of the reconstruction contracts in 1924 was $23,124 per mile, exclusive of the Rincon sea wall.

During 1924 the State Highway Department spent for reconstruction the sum of $5,091,489.02 as compared with $3,721,233.10 for maintenance and minor betterments. The amount expended for reconstruction was small as compared with the amount of actual need for such work. During 1925, it is apparent from the records now before the Highway Commission, that the funds available for reconstruction will be sufficient for not more than one-third the amount of reconstruction for which there is already a pressing need.

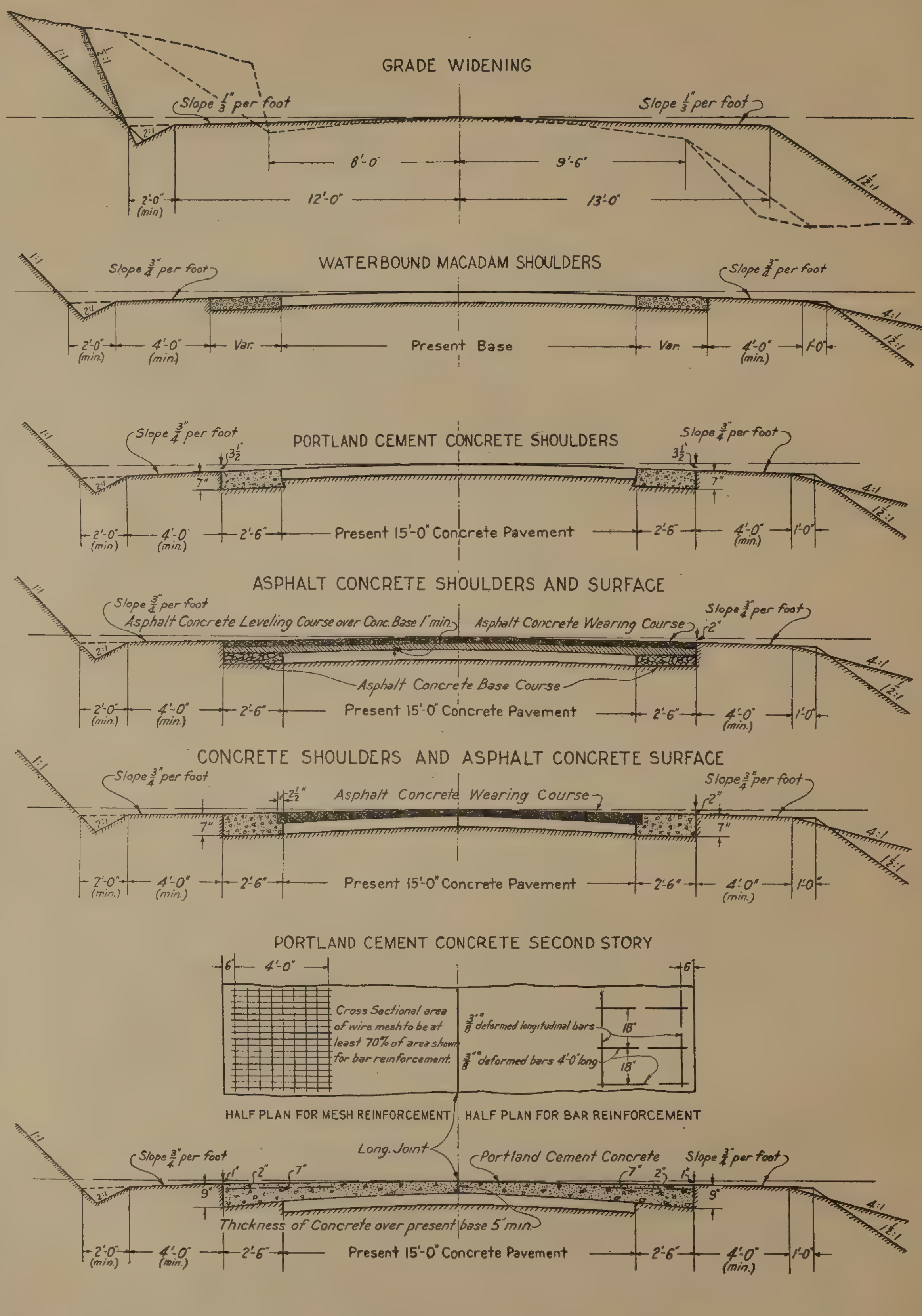
In the following section on "Funds for Maintenance and Reconstruction" will be found discussion of probable future funds available for reconstruction as compared with the needs for such work.

Reconstruction is vital, first, because our lightly built roads must be protected to preserve the original investment, and, second, to make it possible to maintain them in serviceable condition. The policy of the state is to choose for early reconstruction, those sections upon which the deterioration has outstripped economical maintenance.

The second need is for widening the existing grades and pavements to accommodate increased traffic. Pavements 15 feet in width become overstressed by a vehicular traffic averaging in excess of 1000 vehicles per day. When made 20 feet, further widening can probably be postponed until the traffic approaches 10,000 vehicles per day, although a traffic of 6000 vehicles per day overcrowds the 20-foot pavement and reduces somewhat the efficient use thereof.

The plate on the following page shows typical cross-sections being used by the State Highway Department for widening and thickening pavements on reconstruction work.

We recommend that the reconstruction work now being carried on by the state should be continued as rapidly as funds can be made available to the end that previous investments in light types of construction may be saved and present dangerous conditions eliminated.


GRADE WIDENING
Slope 1/3" per foot
Slope 1/3" per foot
1:1
1:1
2:1
8'-0"
9'-6"
2'-0" (min)
12'-0"
13'-0"
1 1/2:1
WATERBOUND MACADAM SHOULDERS
Slope 3/4" per foot
Slope 3/4" per foot
1:1
2:1
2'-0" (min.)
4'-0" (min.)
Var.
Present Base
Var.
4'-0" (min.)
1'-0"
4:1
1 1/2:1
PORTLAND CEMENT CONCRETE SHOULDERS
Slope 3/4" per foot
Slope 3/4" per foot
3 1/2"
7"
2'-0" (min)
4'-0 (min.)
2'-6"
Present 15'-0" Concrete Pavement
2'-6"
4'-0" (min.)
1'-0"
4:1
1 1/2:1
ASPHALT CONCRETE SHOULDERS AND SURFACE
Slope 3/4" per foot
Asphalt Concrete Leveling Course over Conc. Base 1" min.
Asphalt Concrete Wearing Course
2"
Slope 3/4" per foot
Asphalt Concrete Base Course
2'-0" (min.)
4'-0" (min.)
2'-6"
Present 15'-0" Concrete Pavement
2'-6"
4'-0" (min.)
1'-0"
4:1
1 1/2:1
CONCRETE SHOULDERS AND ASPHALT CONCRETE SURFACE
Slope 3/4" per foot
2 1/2"
Asphalt Concrete Wearing Course
2"
Slope 3/4" per foot
7"
7"
2'-0" (min.)
4'-0" (min.)
2'-6"
Present 15'-0" Concrete Pavement
2'-6"
4'-0" (min.)
1'-0"
4:1
1 1/2:1
PORTLAND CEMENT CONCRETE SECOND STORY
6"
4'-0"
6"
Cross Sectional area of wire mesh to be at least 70% of area shown for bar reinforcement.
3/8" deformed longitudinal bars
18"
3/8" deformed bars 4'-0" long
18"
HALF PLAN FOR MESH REINFORCEMENT
HALF PLAN FOR BAR REINFORCEMENT
Long. Joint
Slope 3/4" per foot
Portland Cement Concrete
Slope 3/4" per foot
1"
2"
7"
7"
2"
1"
9"
9"
Thickness of Concrete over present base 5" min.
2'-0" (min.)
4'-0" (min.)
2'-6"
Present 15'-0" Concrete Pavement
2'-6"
4'-0" (min.)
1'-0"
4:1
1 1/2:1

STATE OF CALIFORNIA
CALIFORNIA HIGHWAY COMMISSION

TYPICAL CROSS SECTIONS — WIDENING AND THICKENING

FUNDS FOR MAINTENANCE AND RECONSTRUCTION.

All costs for maintenance of the state highways and for their widening and reconstruction are paid from the Motor Vehicle Fund and the Motor Vehicle Fuel Fund.

The Motor Vehicle Fund law has been several times amended since its original passage in 1913. The former basis of license fee was changed by the Motor Vehicle Act of 1923, from a tax of 40 cents per horsepower to a flat fee basis of $3 for each registration, with a surcharge on a weight basis on commercial vehicles and trucks. Proceeds from motor vehicle license levies are distributed in August and February of each year.

In 1923 there was enacted a Fuel Tax Law, providing for a license tax on the manufacture and sale of motor fuel in amount of 2 cents on each gallon. This act became effective during the last quarter of 1923. Proceeds are distributed in May for the fourth and first quarters, and in November for the second and third quarters of each year.

Both of these measures provide that the net balance, after deducting cost of collection, shall be divided equally between the counties and the state, to be used in both cases only for highway purposes. The state's use of the money is limited to maintenance and reconstruction.

During the first few years a considerable part of the state's share of the Motor Vehicle Fund was used by the State Engineer in maintaining legislative act roads. Later the maintenance of such roads and all of the state's share of this fund was turned over to the State Highway Department.

From the beginning of the operation of the motor vehicle license law up to July 31, 1924, inclusive, the amounts shown in the following tabulation were distributed from the fund to the State Highway Department after deducting costs of collection and expense of the Motor Vehicle Department.

The year indicates the motor vehicle registration year in which funds were collected and not the year in which they were distributed. The registration year runs from February 1st to January 31st of the following year.

Year	Amount	Per Cent Increase
1914	$591,228 72	
1915	932,492 79	57.72
1916	964,784 65	3.46
1917	1,247,268 80	29.28
1918	1,421,319 79	13.95
1919	1,924,299 77	35.39
1920	2,434,800 56	26.53
1921	3,018,192 36	23.96
1922	3,785,054 94	25.41
1923	4,878,394 72	28.89
1924 Registration to 7-31	2,536,719 35	
Total	$23,734,556 45	

The 1924 registration year closed on January 31, 1925, with receipts which will make the state's actual share of the year's revenue $3,079,658.85.

The 2-cent gasoline tax law went into effect October 1, 1923. The state's actual apportionment from this fund for the last quarter of 1923 and the first three quarters of 1924 was $6,063,072.75. The data on one year's operation of this tax set forth in tabulation under the section "Financing" indicates that this apportionment would have been only approximately $5,994,110 except for the fact that refunds for motor fuel not used on the highways did not begin until February, 1924, and always lag as much as six months behind date of purchase. The first year, therefore, had relatively light refunds.

For forecast of future income from registration and gas tax revenues, and further data, see section on "Financing."

The actual cash receipts distributed to the State Highway Department during the calendar year 1924 from both new and old registration and from gasoline taxes and available for maintenance and reconstruction during the year were as follows:

February, 1924—Collection from old horsepower tax, last half of 1923	$225,309 58
May, 1924—First 6-month gas tax to March 31, 1924	2,766,943 03
August, 1924—First 6-month license fees registration to July 31, 1924, under new law	2,536,719 35
November, 1924—Gas tax 2d and 3d quarters, 1924	3,296,129 73
Total received during year	$8,825,101 69

From these funds the state expended during the calendar year 1924 the following amounts:

For general maintenance and minor betterments	$3,721,233 10
For reconstruction	5,091,489 92
Total	$8,812,723 02

A review of the foregoing sections on "Maintenance" and "Reconstruction" in connection with the section on "Traffic Increase" shows convincing evidence pointing to the ever-growing expense for maintenance and minor betterment and the tremendous reconstruction expenditure facing the state in the next five years.

Accurate determination of the sums which will for each year of the immediate future, have to be set aside by the Highway Commission to meet the requirements of general maintenance and minor betterments, is not possible for the committee, in the limited time that can be allowed to this investigation. The amounts used for general maintenance depend largely upon the standard of excellence set, which tends to rise with traffic increases, thereby offsetting dissatisfaction which would otherwise exist on the part of a larger number of road users.

General maintenance expense will increase immediately by not less than $600,000 or $700,000 annually, if our recommendation for the maintenance of unconstructed highways is adopted. It will tend to increase as the existing improvements become older and less able to withstand the wear and tear of traffic. It will also increase with increased traffic. It may tend to decrease slightly as a greater mileage of high standard improvements are added either through new or reconstruction.

It cannot be expected that any improvements will be installed, no matter how high the type, that will not require general and systematic maintenance.

The best determination which we can form from a study of figures taken from the Highway Commission's records, and consideration of proposed increased mileage of unbuilt roads, indicates that the requirements for general maintenance and minor betterments for the next few years will be not less than 45 per cent of the total annual revenues, due the State Highway Department from the existing registration and gas tax, including the anticipated increase in these funds due to increased motor vehicle use.

Projected revenues from the state's share of existing registration and gas tax revenue measures for the six-year period 1925 to 1930, inclusive, indicate that a total can be expected for maintenance and reconstruction of about $75,000,000. Assuming that 55 per cent of this money, after providing for maintenance and minor betterments, will be available for reconstruction purposes, not to exceed $41,250,000 will be realized. This would indicate that in that period not over two-thirds of the reconstruction work now considered necessary and estimated at $65,000,000, can be financed from the proceeds of existing revenue measures.

By 1930 traffic increases will probably render imperative the reconstruction of other sections of highway which are now serving the traffic in satisfactory manner, and which are not now contemplated in reconstruction estimates.

These considerations, together with a careful study of probable future revenues from these funds as set forth in section on "Financing," lead the committee to *recommend that on account of the requirements for maintenance and the urgency of reconstruction needs due to traffic conditions, the existing revenue for maintenance and reconstruction purposes be not reduced in amount or rate of levy.*

STAGE CONSTRUCTION.

The question of paving enters largely into the estimate of cost. Paving of a highway should depend upon its traffic. It is the opinion of the committee that no highway should be improved in excess of its earning capacity, and the program of our highway development should contemplate stage construction. By this is meant the construction of adequate grades, drainage and rock surfacing; to be maintained until unreasonable expense and loss in efficiency of highway surface, caused by heavy traffic, dictate investment in a more efficient and cheaply maintained surface.

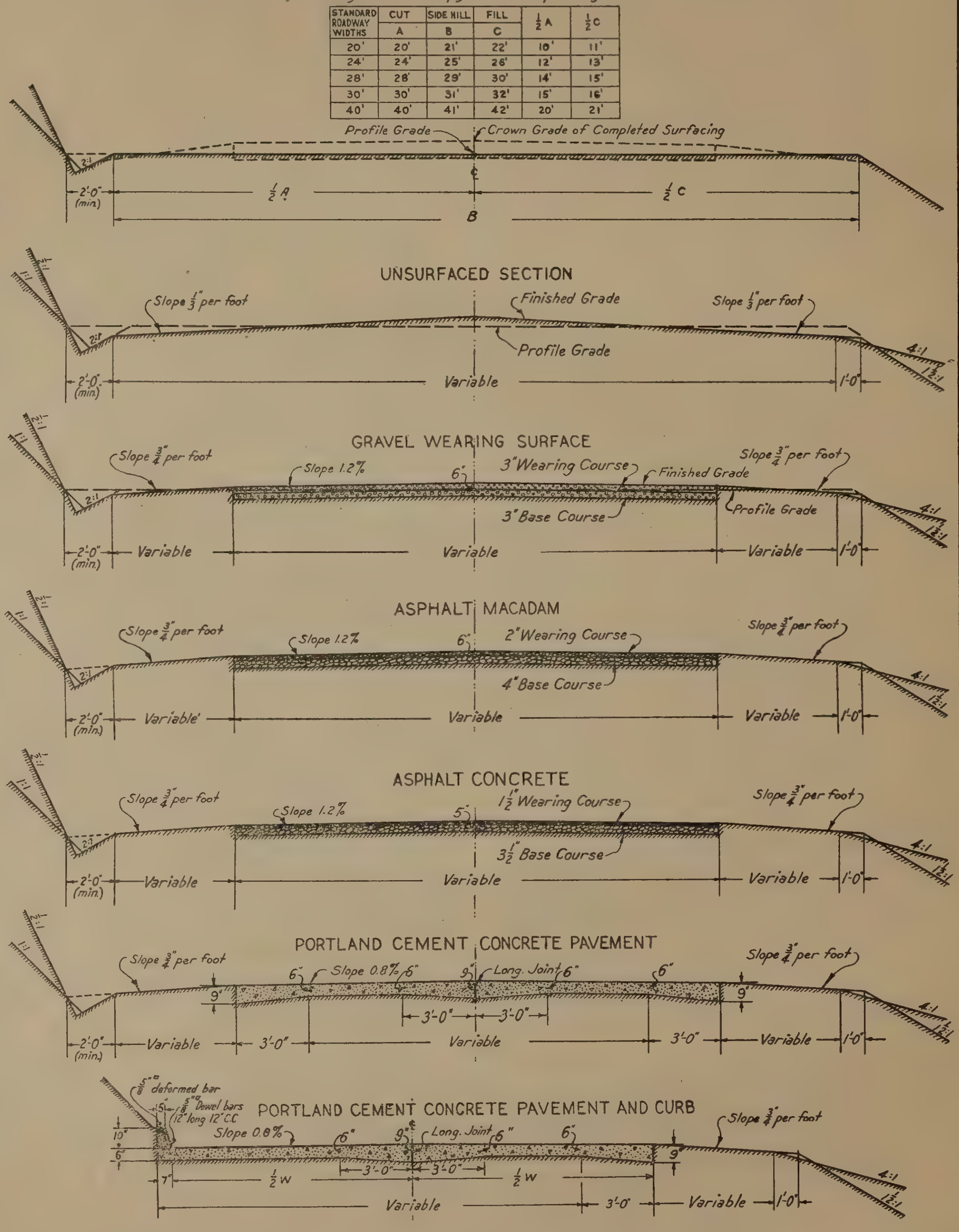
Grading, drainage and rock or gravel surfacing will, on many of the unbuilt highways, postpone for many years an expenditure for paving. However, the increase in population of the state, and the more general use of motor vehicles for commercial and recreational purposes which follows the initial highway improvement, will sooner or later, on many of the roads, require heavier investments in more permanent types of surfacing than would probably be selected, if now installed, for today's traffic.

On those roads where heavy traffic will soon force the construction of pavement, the use of a cheaper initial surfacing is justified by the better settlement of fills and the stronger subgrade provided by the rock or gravel used as temporary surfacing.

We recommend that no highway should be improved in excess of its earning capacity, and that the program for state highway development should contemplate stage construction.

STANDARD GRADING SECTION, ILLUSTRATING METHOD OF DESIGNATING ROADWAY WIDTH

Standard roadway width to be designated as width in thorough cut, dimension "A" in the table.
Reference to a standard roadway width will imply the corresponding dimensions as shown in the table.



STANDARD ROADWAY WIDTHS	CUT	SIDE HILL	FILL	½ A	½ C
	A	B	C		
20'	20'	21'	22'	10'	11'
24'	24'	25'	26'	12'	13'
28'	28'	29'	30'	14'	15'
30'	30'	31'	32'	15'	16'
40'	40'	41'	42'	20'	21'

Note:
Thickness of surfacing shown is minimum, and is increased where conditions require.

STATE OF CALIFORNIA
CALIFORNIA HIGHWAY COMMISSION

TYPICAL CROSS SECTIONS — NEW CONSTRUCTION

CONSTRUCTION STANDARDS.

The typcial cross-sections now in use by the Highway Commission on new construction are shown in the plate on opposite page. The pavement thicknesses shown are the minimum and are increased as conditions require. Subgrade treatment with gravel or porous material with slight capillary action is used on bad sections of adobe or water-holding soils.

PAVEMENT TYPES.

Several excellent types of pavement are used and have demonstrated their utility. Selection of type of pavement is made after consideration of conditions pertaining on each individual section of highway. There is less reason for standardizing on only one type of pavement in this state, where are found all of the various construction materials for each type, than in states not so favorably endowed with natural resources.

PAVEMENT WIDTH.

For safe two-way traffic on outlying highways, pavement or other surfacing should be at least 18 feet in width. It is the opinion of the engineers on our committee that the additional cost to construct a pavement or other surfacing to a width of 20 feet is justified and can be offset by the saving in maintenance cost on shoulders and on the edges of the pavement itself.

On a 20-foot width of pavement, at least 6000 vehicles a day can be efficiently accommodated, and with a slight loss in efficiency, such as increasing the danger in passing or by lowering of the average speed, traffic up to at least 10,000 vehicles can be taken care of. When the traffic is more than 10,000 vehicles, the need exists for either a still wider pavement or for two separate pavements, each to be used by only one-way traffic. The amount of daily traffic to be accommodated is the feature which should govern pavement standards.

On the sections of highways immediately adjacent to cities where there is much local traffic, the problem becomes one of street construction. The state must be prepared to do its part, as the owner of the road, in providing traffic facilities in areas almost urban in character.

CURVATURE.

The modern method of transportation requires clear sight distance on curves, sufficient to give several seconds warning to drivers approaching from opposite directions. A machine traveling at 30 miles per hour covers 44 feet in a second, and with two machines approaching from opposite directions, the distance covered is 88 feet per second. Therefore, it is found that 300 feet of clear sight distance is none too much for safety. This provides at least three seconds for each driver to control his car.

WIDTH OF GRADE.

A width of 20 feet of roadway should certainly be the minimum for constructing grades on our mountain roads where sharp turns are frequent and high speed is sometimes indulged in. This is the least width which provides any factor of safety. To construct this width on much of our heavy mountain grading, and in addition provide adequately for drainage, requires heavy grading quantities. Your committee does not consider it feasible or economically sound to build the original construction on the mountain roads to a less width with the expectation that funds will be available in the future for widening.

The width to be graded is an important factor in making the detailed location of a mountain highway, and never, without lack of economy in the original construction, is it possible to widen a narrow mountain highway by only making parallel additional excavation. Introduction of some new alignment is always necessary. This is exemplified at the present time on the section of highway between Redding and Dunsmuir on which several sections have recently been regraded.

There is no short cut in grading in mountainous country which will result in the minimum safe width of roadbed, preserve safe standards of alignment, and at the same time reduce cost.

On the flat valley construction, a width of 30 feet of grading is none too much, with drainage provisions in addition. This is the minimum width required for a vehicle to conform to the state law and park clear of the pavement for repairs, etc. We have many times observed the menace to traffic caused by cars stopping on paved or surfaced portion of the road. It seems logical that in the valley areas the minimum width of grade should be at least 30 feet, and where possible, a greater width should be made available for vehicle use. In the mountainous country turnouts and parking places should be frequently provided so as to permit vehicles to park clear of the roadway.

All of these considerations translated into money mean greater average costs than for past work. Expected increases in traffic, and the greater future use of the roads will demonstrate the wisdom of such construction policies.

To realize the full value from our highway investments, situations which create danger must be corrected in the road designs, and if we are to have a highway system adequate even for present traffic demands, vision must be used in the adoption of construction standards.

BRIDGE CONSTRUCTION.

Our state wide inspection of the state highways, supplemented by the estimates furnished by the State Highway Commission, show that bridge construction has seriously lagged behind the completion of highways; also that the problems in some of our remote counties are made more serious by the large number of expensive bridges and other structures which must be completed in order that the roads may be serviceable.

The practice inaugurated early in the highway program by the State Highway Commission, of requiring counties to build the bridges within their borders, has been justified, and has resulted in supplementing of State funds to the extent of $6,155,969. However, it must be admitted that the type of bridges which now are required for main line highways are beyond the financial capabilities of the weaker counties, as well as a serious burden to the stronger counties, and the state must come to the rescue both of the counties and of the state highway system.

In addition to many bridges which have already outlived their usefulness, we find throughout the state highway system scores of structures built prior to the beginning of state highway construction, which are still probably too good to justify immediate replacement, but which are structurally weak and unsafe for future traffic. Such structures will ultimately have to be replaced, and are included in the cost estimates.

There has been a distinct advance in the past fifteen years in width and strength of bridges. Instead of restricting the highway width, bridges and other drainage openings should be wide enough to permit passage of traffic with equal ease as on adjacent road sections. The economy effected by restricting bridge width is at the sacrifice of highway efficiency and results in a real danger to traffic.

New structures should be designed to a greater width than the adjacent pavement, even to the full width of the grade in the case of medium spans. They must be designed to carry the maximum loading of as many trucks as may at one time come upon their surface.

The present tendencies toward the design of six and eight wheel trucks which will increase the carrying capacity and total weight without increasing the weight per inch width of tire on the road surface, are being closely followed by highway engineers. The development and use of such trucks will require still heavier designs than now used for highway bridges.

The State Highway Commission's estimate of the cost of necessary bridges on the primary road system, as we have classified it, is $13,460,000.

We believe that the best means of accomplishing, within a reasonable time, the major bridge construction, and the important grade crossing eliminations, would be by means of a general state bond issue for that purpose, sufficient in amount to handle the work on the primary system.

The committee recommends that the policy of the state should be to assume all future costs of construction on both minor and major structures on the state highway system, accepting such donations as may be offered.

RAILROAD—HIGHWAY GRADE CROSSINGS.

A phase of the problems, which has received only casual financial recognition in the past, is the elimination of grade crossings. Through relocation of highways during their construction, much has been accomplished in the elimination of grade crossings, but only a small start has been made on the actual elimination of crossings which could not be eliminated by relocation. Our railroads are alive to this question, and our Railroad Commission is constantly calling attention to the necessity for wholesale elimination. They now frequently refuse to grant permits for the opening of new grade crossings, except where there is an elimination of existing crossings.

Due to the necessity for increased width and better alignment on our primary road system, the expense of necessary eliminations is tremendous. The Highway Commission estimates the cost of elimination of grade crossings on the trunk line system now open to traffic at $15,000,000.

The urgent need for grade crossing elimination as a means of saving the hundreds of lives of negligent drivers and innocent passengers sacrificed at present is too well established in the minds of all to need any argument or further evidence.

As the most logical solution of the problem, the committee *recommends a bond issue of twenty-five million dollars in short term bonds to be used solely for railroad-highway grade crossing elimination work and for bridge construction on the primary system of state highways as classified by the committee.*

RIGHTS OF WAY.

We see no reason why the State Highway Commission should continue the policy of insisting that the local communities and counties furnish rights of way for state highways. This, in many cases, has meant and still means large outlays on the part of the counties for expensive rights of way which, even if the expense can be afforded by the counties, can only be regarded as a forced financial contribution to state highway construction funds. The State of California can well afford to defray all proper costs of rights of way where county aid is not freely offered or rights of way donated.

Delay in obtaining rights of way has meant the embarrassment of the construction organization, and particularly contractors, who have in many cases had claims against the state for financial loss because rights of way were not ready to enter upon.

We find that local influence in the routing of highways in the past is now meaning thousands of dollars extra expense to the state in reconstruction costs. In many locations the rights of way originally accepted as a matter of compromise in order to avoid further delay, and to permit projects to go forward, now require modification and changing, not only at additional expense for additional rights of way, but at increased cost for reconstruction.

The policy of the State Highway Commission in asking counties to assume this burden is now untenable, however great the justification may have been considered in the past. The policy of the State Highway Commission should be in the future to conduct through its own organization negotiations for rights of way, accepting, of course, such local assistance as may be obtainable and such aid as may be offered.

Present statutes vest full power in the State Highway Commission in this regard. The state has the right of condemnation and the acquiring of land through eminent domain proceedings.

We, therefore, *recommend that the State Highway Commission should more freely exercise its rights of condemnation and not permit important projects to be postponed on account of delay in acquiring rights of way, and that it should be the policy of the Highway Commission to assume all future costs of rights of way, accepting such donations as may be offered.*

RECONSTRUCTION OF COUNTY-BUILT ROADS.

In those counties which have constructed pavements on state highway locations, there is a very definite conviction that they have been penalized for their enterprise, and that counties which were not so progressive have profited by having had constructed, at state expense, the state highways within their borders. There is little argument against this line of reasoning.

It has seemed proper to the committee to include these county-built roads in estimates for future construction expenditure rather than in estimates for reconstruction.

The rebuilding of these county roads is one of the major problems confronting the state. Most of them were built even prior to the beginning of state highway construction, and only by thorough and costly maintenance have many of them been kept in usable condition during the past few years.

It is urgent that the rebuilding of these sections should be made possible from construction funds, for if their rebuilding depends on the program of reconstruction under existing revenues, it will be many years before the state will be relieved of the heavy expense of maintaining these lightly built sections, and meanwhile the public is being penalized by poor road surfaces. Therefore, in the estimates of cost of completion is included the rebuilding or resurfacing of 273 miles of county-constructed pavement on state highways, which represents the mileage of county-built roads not already reconstructed or provided for on December 31, 1924.

ESTIMATED COST TO COMPLETE STATE HIGHWAY SYSTEM.

The committee has endeavored to assemble estimates of the cost of completing the existing state highway system. A summary of these estimates is herewith presented. More detailed figures by routes, classification, and districts are to be found in Appendix C of this report.

Present State Highway System.

Type	Miles	Cost
Grading, rights of way and structures	2,792	$62,706,572
Rock surface	2,694	20,896,851
Paving	2,471	66,209,712
Road construction total	3,877	$149,813,135
Major bridges		14,269,530
R. R. grade separations		13,677,500
Subtotal		$177,760,165
Contingencies 10 per cent		17,776,017
Subtotal		$195,536,182
Administration and engineering, 11 1-9 per cent		21,726,242
Total		$217,262,424

Recommended Additional Roads.

Right of way, grading structures, paving	190	6,519,333
Grand total		$223,781,757

The details of this estimate have been accumulated by the state highway organization and in general represent a combination of their ideas and those of the committee as to what will be required on the present highway system in a period of from 10 to 20 years. There are so many uncertain factors as to what the future will make necessary in the way of highway improvement that the major value of the estimate is to serve as an indication of the size of the financial problem with which the state is dealing on its highway system.

Sections upon which future paving is now estimated may not require paving for at least ten years. Sections which in view of our present information we now believe will require only grading and inexpensive rock or gravel surfacing, may, due to local conditions, develop traffic which can not now be foreseen, and may in the future demand expensive paving.

It would probably be unwise to base a financing program solely on these estimates. We would seriously question the wisdom of planning to materially exceed in 1926 the rate of progress and expenditure made in 1922 and 1923. At least so long as the highway system remains at its present size, funds should be so planned as to afford a rate of construction expenditure increasing annually thereafter in the same ratio as the increase in motor vehicle use.

It is a fact often overlooked that the cost of highway construction has increased since the war, just as the cost of all other commodities and wages has increased. The general average of commodity increase between 1912 and 1924 has been about 80 per cent. The wages of labor in California average 100 per cent increase over that year. Almost all highway costs can be analyzed back to labor costs. This means that the *same highway* which could be built in 1912 for $10,000 per mile will now cost from $18,000 to $20,000 per mile.

The development of traffic and the great need of the public for more efficient road improvements has required the highway builders throughout the nation—and California is no exception—to make their designs more massive and use more unit quantities of material per mile of road. The type of pavement originally built in California has long ago been proven entirely inadequate, except for very light traffic, and at the present time all road building agencies, both state and county, as well as your committee, are convinced that both wider and heavier pavements must be built.

The present minimum standard of cement concrete pavement construction used by the State Highway Commission requires about 2100 cubic yards of concrete per mile, whereas the pavement standardized in 1912 required only 978 cubic yards of concrete per mile. This is an increase of about 115 per cent in quantities, and, *therefore, it is evident that a design of concrete pavement now considered suitable for present and future traffic will average in cost more than four times as much per mile* *as the design considered suitable for traffic in 1912.*

These figures are borne out by records of construction. The average price paid by the state for concrete pavement during the period from 1912 to 1916 was $6.35 per cubic yard. The average price paid during 1923 and 1924 was $13.40 per cubic yard (see biennial report of State Highway Commission, 1924, page 194).

Similar conditions obtain in other types of paving, and in grading work. The price in 1912 for average grading was 39 cents per cubic yard. The average in 1924 was 75 cents. Grading quantities per mile for the more recent highway construction, which is generally in rough country, will average many times more than the average grading quantities on the construction in the valleys, where so much of the early work was done.

It can be readily understood that with the heaviest grading sections remaining to be completed, the cost per mile of the grading portion of the work will be many times the average grading cost on work already completed.

A summary follows of some of the uncertain factors entering into the estimate above presented:

1. Standards for construction. Widths of grading and bridges, length of drainage structures, curvature, rates of grade and thickness of surfacing, all of which now seem adequate may, during a lengthy construction period, gradually have to be modified.

2. Economic changes affecting wages and material costs, may, during the construction period, raise or lower the unit costs now used.

3. Errors in assumption of amount of future traffic may require modification of assumptions for type of surfacing.

4. Extension of commercial use of highways, by trucking, more rapidly than other use, may require heavier surfacing or paving.

5. Development of traffic in adjacent states, and transcontinental traffic, may require heavier treatment for present light traffic interstate roads.

6. Research constantly under way and the development of machinery may lead to less expensive methods of construction.

RATE OF CONSTRUCTION.

The rate at which new construction should proceed is affected by the following questions:

1. In what period of time do the people of the state want the state highway system completed?
2. How long can the people afford to await completion to realize the large reduction possible in the cost of operation of motor vehicles?
3. At what annual rate can the people of the state afford to provide funds for new construction without assuming an undue burden?

The committee is convinced from its study of the needs and as a result of conferences held all over the state, that the people want each unbuilt road completed without further delay.

The annual dividends in the form of savings to be realized after completion, in decreased expense of owning and operating motor vehicles, plus all other obvious benefits of improved roads, will be many times greater than the annual cost of the investment. *It costs the state more to do without improved roads than it costs to provide them.*

The undertaking is so profitable that the state should so finance the work that it can be carried on at least as rapidly as in the past, and at a rate of increase proportionate to natural increase in resources and highway use. *This can be done on a "pay-as-you-go" basis, without creating an undue burden.*

The construction record of approximately 11½ years past is shown in the following analysis, which includes the mileages of completed contracts and does not include the work in progress on June 30, 1924:

Year	Miles Constructed	Expenditures
1912	------	$594,110 58
1913	44.6	2,098,745 61
1914	223.4	4,555,224 73
1915	486.3	7,846,255 05
1916	296.0	3,096,152 33
1917	94.3	1,997,056 00
1918	186.1	5,987,247 72
1919	193.2	5,620,563 09
1920	242.2	7,242,737 82
1921	282.3	10,847,807 94
1922	410.5	14,090,124 80
1923	392.0	12,188,565 55
1924, to June 30	177.8	4,518,503 14
Totals	3028.7	$80,683,094 36

Major bridges were not generally constructed by the State Highway Department during this period.

A portion of this mileage represents stage construction, with only grading and graveling. It should be noted that during the peak years 1921, 1922 and 1923, progress averaged 361 miles per year and expenditures during the same years averaged $12,300,000 annually. The analysis shows a progress averaging approximately 263 miles per year for 11½ years, which would represent the equivalent of an average in the neighborhood of 220 miles per year of fully completed road, including pavement.

Eliminating the estimated cost of major bridges and grade separations, for the major part of which we have made specific recommendation for a special bond issue, and including contingencies and overhead allowances, there would remain an estimate of approximately $183,000,000 for completing the 3877 miles on which work remains to be done, or an average of about $47,000 per mile.

Therefore, in order to begin in 1926 at an annual construction rate equivalent to 220 miles of completed road to high standards, averaging $47,000 per mile, there would be required about $10,340,000 for the year.

If work should be carried on uniformly at the rate of 220 miles per year, nearly 18 years would be required for the completion of the state highway system.

If the construction were carried on at a uniform rate of $10,000,000 per year, between 18 and 19 years would be required for completion on the assumption that $25,000,000 would also be provided and used in addition to this rate of expenditure for bridges and grade separations.

If the bond issue should not be provided, nearly 22 years would be required with a uniform expenditure of $10,000,000 annually.

We believe that the people of this rapidly growing state would be soon voicing their dissatisfaction with a program which would require from 18 to 20 years for the completion of the already existing state highway system, and a still longer period if the system is enlarged in the meantime.

If highway construction revenues are derived from motor vehicles, estimated registration figures must be used as a basis of predicting those revenues. Tables are presented under the heading "Financing," which show our estimate of this increase to the year 1935.

Examination of these tables shows an estimated total increase of about 50 per cent, for the 10-year period from 1926 to 1935. Assuming that this same rate of increase would prevail beyond 1935, and translating the registration and revenue into 213 miles of completed highway, at $47,000 per mile, obtained from an expenditure of $10,000,000 in 1926, and increasing this uniformly until 1939, we find 351 miles of completed highway obtained from an expenditure of $16,500,000 in that year. From this we get the figure of 14 years for the completion of the now uncompleted 3877 miles.

Assuming that federal aid payments to the state should continue as in the past few years, at the rate of $2,460,000 annually, this sum would defray the cost of an additional 52.4 miles of completed highway per year. If to the completed mileage obtained annually from state's funds, there should be added the additional mileage which might be completed from federal aid money, the effect would be to shorten the completion time for the 3877 miles by only two years. Federal aid receipts in a period of 12 years would have defrayed the cost of completion of 629 miles.

Federal aid continuation is uncertain, and should not be too strongly counted upon in the planning of state highway progress. Strong opposition exists to the present scheme of federal aid in some of the eastern states.

Our study of the state highway situation convinces us that the average amount to be expended for state highway construction should at least equal in amount the annual expenditures made from the assets of the third bond issue, which for the years 1921, 1922 and 1923 averaged about $12,300,000 per year.

If our estimates of future registration and revenue should be exceeded, the only result would be to permit slightly faster progress than here estimated. It is unlikely that the state highway construction will outstrip the universal and insistent demands for better highway transportation.

While a large amount of preliminary grading is under way on some sections of highway, and preliminary surfacing on others, in order both to open them more quickly to travel, and to carry out the policy elsewhere referred to of stage construction, new paving must continuously be installed on sections where traffic developments require it. Universal demand exists for these improvements on present state highways, without reference to the demands for new state highways.

We therefore recommend that the state should adopt a plan of financing which will provide for the completion of construction on the present state highway system within a maximum period of 14 years. To this end we recommend that construction revenues should be provided in an amount of $10,000,000 available for the year 1926 and increased annually thereafter in proportion to the increase in motor vehicle registration until completion.

Such a rate of financing would provide for a rate of progress equivalent to the completion of 213 miles of the remaining highways in 1926, increasing to approximately 351 miles in the final construction year, which would complete the existing state highway system by the beginning of 1940. If the highway system should be increased by additional roads without additional financing, the year of completion would be postponed accordingly.

If federal aid should continue as in the past (of which there exists grave doubt), the only effect would be to shorten the time of completion to 12 years instead of 14, which would be desirable.

The rate of construction financing here recommended appears conservative when compared with the 1925 construction programs of a number of the leading states having less motor vehicles than California and less distances over which to extend their highway systems.

RATES OF CONSTRUCTION IN OTHER STATES.

The rate at which new state highways are being built in other states is shown in the tabulation below compiled from replies to our inquiries.

The tabulation shows the funds planned to be expended in 1925 for new construction, for reconstruction and for maintenance, as well as the rate of new road construction per registered motor vehicle.

It will be seen that the expenditure for new construction during the year will be $8,000,000 or more in each of fourteen states, and that it will be $10,000,000 or more in nine states. Six states will expend $15,000,000 or more each, and five will expend $20,000,000 or more. Pennsylvania leads with $45,000,000 for new construction and an additional $21,000,000 for maintenance and reconstruction, while Illinois is a close second with $42,000,000 for new construction alone. New York, with the largest

(Continued on next page.)

PROGRAM OF EXPENDITURES FOR STATE HIGHWAYS IN 1925.

State	Number of vehicles registered	Estimated expenditures from all sources			Expenditures per vehicle for new construction
		New construction	Reconstruction	Maintenance	
Alabama	158,019	$7,000,000		$360,000	$44 30
Arizona	57,828	4,000,000		1,000,000	69 17
Arkansas	143,000	6,000,000	$500,000	1,500,000	41 96
California	1,350,759	4,500,000	5,700,000	4,300,000	3 33
Colorado	213,247	*3,350,000		800,000	15 71
Connecticut	222,222	1,500,000	4,000,000	3,000,000	6 75
Delaware	34,600	2,000,000		121,514	57 80
Florida	210,000	8,000,000		500,000	38 10
Georgia	209,000	3,600,000	300,000	1,900,000	17 22
Idaho	70,660	1,440,000		*560,000	20 38
Illinois	1,132,641	42,000,000		2,500,000	37 08
Indiana	651,705	9,000,000		*6,000,000	13 81
Iowa	619,000	7,000,000		3,000,000	11 31
Kansas	377,544	‡			
Kentucky	231,784	6,500,000	750,000	1,250,000	28 04
Louisiana	178,000	8,000,000		2,000,000	44 94
Maine	127,178	2,000,000	1,000,000	1,500,000	15 73
Maryland	209,000	3,550,000		*3,300,000	16 99
Massachusetts	685,774	2,000,000	4,500,000	1,500,000	2 92
Michigan	883,000	*10,000,000		x	11 33
Minnesota	525,000	6,000,000		4,000,000	11 43
Mississippi	134,657	2,500,000		750,000	18 57
Missouri	547,000	23,000,000		2,000,000	42 05
Montana	79,965	‡			
Nebraska	300,000	3,500,000		1,750,000	11 67
Nevada	18,327	2,500,000		230,000	136 41
New Hampshire	73,633	1,900,000		*1,740,000	25 80
New Jersey	517,000	9,000,000		2,500,000	17 41
New Mexico	41,750	*1,550,000		550,000	37 13
New York	1,420,000	*27,000,000		14,500,000	19 01
North Carolina	305,756	§16,000,000			52 33
North Dakota	117,050	§2,800,000			23 92
Ohio	1,244,000	‡	1,500,000	6,500,000	
Oklahoma	337,740	7,320,000	500,000	1,500,000	21 67
Oregon	192,615	3,000,000	1,000,000	1,250,000	15 58
Pennsylvania	1,200,000	45,000,000	2,000,000	19,000,000	37 50
Rhode Island	114,000	300,000	2,000,000	1,000,000	2 63
South Carolina	162,749	3,000,000	600,000	1,900,000	18 43
South Dakota	142,396	4,177,000		650,000	29 33
Tennessee	205,821	*9,000,000		2,000,000	43 73
Texas	830,000	§20,000,000			24 10
Utah	72,000	1,874,000	200,000	410,000	26 03
Vermont	61,179	1,500,000	300,000	1,000,000	24 52
Virginia	270,000	*6,147,000	3,000,000	x	22 77
Washington	306,000	5,000,000		1,500,000	16 34
West Virginia	199,805	*10,000,000		1,750,000	50 05
Wisconsin	500,000	11,000,000		6,500,000	22 00
Wyoming	43,609	2,200,000			50 45
Totals	16,025,504	$356,708,000			$22 26

*Includes reconstruction.
‡Depends on Legislative provisions.
§Total expenditures.
xNot reported.

motor vehicle registration, slightly exceeding that of California, will expend $27,000,000, while Missouri, with less than one-half the motor vehicles in California, will expend $23,000,000 in 1925 for new state highway construction.

It should be noted that the state of Florida, with a registration of only 210,000 motor vehicles and with comparatively small population and resources, is expending $8,000,000 in 1925 on new roads, having found that its state highway system is bringing wealth into the state so rapidly as to make road building the state's most profitable investment.

The number of vehicles is a direct measure of the traffic to be carried in each state. A comparison of the tabulated rates of annual expenditure from all sources per registered motor vehicle for new construction is of especial interest and shows some surprising results.

The average rate of construction per vehicle is $22.26 while Nevada heads the procession with $136.41 per vehicle.

California with only $4,500,000 in sight for new construction in 1925 stands at $3.33 per vehicle, which is the lowest rate of all except Rhode Island and Massachusetts, both of which are pioneers in state road building and because of small area have practically completed their initial improvements.

If California's rate for new construction were increased to $10,000,000 in 1926 it would stand at $6.21 per vehicle on that year's estimated registration, while at $12,000,000 per year it would be $7.45, leaving it still only fourth from the lowest of all states reporting.

A number of the states with large annual expenditures for new work, such as New Jersey, New York and Pennsylvania, have been building state highways at a substantial rate for many years. The state of Illinois during 1924 alone constructed nearly half as many miles of heavy state highway pavement as have been paved from our state and federal funds since the beginning of state work. During the same year, by an overwhelming popular vote, Illinois started on a new $100,000,000 construction program to be financed by bonds paid for entirely by motor vehicle taxation.

A comparison of the rates of progress in the various states, as well as expenditures per motor vehicle, would indicate that we have recommended a very conservative rate of construction. California with its unexcelled natural resources, travel attractions, and rapid growth in population must be adequately served by a state highway system if we are to maintain our well advertised position as a national playground, as well as an agricultural and industrial commonwealth.

WHY STATE HIGHWAYS?

We have given much serious thought to the question as to why the state should interest itself financially in highway construction. Also, if it is proper for the state to interest itself in highway construction, is there a limit to its interest?

There is only one major reason that the state should interest itself in highway construction located in the various counties. That is, in order to accomplish, for the benefit of the people of the whole state, a purpose which the counties, functioning separately, can not so well accomplish.

The tremendous development of motor transportation in the United States, and particularly in California, has brought to the people incalculable gains. Where means of rapid transportation of men and freight already existed, it supplemented them by providing feeders and connections, by offering for freight alternative and more flexible service, and for men, what is often a more pleasant, faster, or cheaper method of travel than was already available. The development of motor transportation has been one of the outstanding factors of American life of the last two decades, and it is impossible to overestimate the contribution it has made to our social and economic welfare.

Due to the rapidly increasing facilities for travel, a public necessity has developed for continuity and uniformity in construction and maintenance of our main lines of travel. There has also developed a desire for highways reaching into the outlying and undeveloped sections and into the vast recreational areas of the state.

For each county to do its part in the construction of primary roads is not within the ability of the counties through which these primary roads are logically located. Many of the counties do not possess the resources to finance such work.

The only practical way in which roads desired universally by the people of the state can be built is to set up a State Highway Department, provide funds and proceed to construct those highways which the business of the people of the state requires.

In selecting the roads for a state highway system, only those should be included which are of state-wide necessity and use.

RELATIVE IMPORTANCE OF THE HIGHWAYS.

There can be little question as to the right and equity as well as the necessity of the state as a whole, through a centralized department, undertaking the construction and maintenance of those roads of general state wide use.

Until the primary roads of general state wide necessity and use are put into condition for general state wide traffic, there is, however, serious question as to the propriety of the state assuming the burden of construction and maintenance of highways which do not meet the definition of being of state wide necessity and use.

The burdens of taxation for all manner of improvements are tremendous, both for local and for state purposes. Through the satisfying of local demands for construction of highways, the state can assume a financial obligation beyond any reasonable means of fulfilling. There have already been included in the state system roads which have no logical or defensible position in that system, at least at the present time.

It is admitted that there is probably a limited general state wide benefit derived from the improvement of almost any highway in the state. The benefit accrues to several classes of individuals, and includes the motorist who is constantly demanding additional locations for recreational travel, the property abutting on or using the improved highway, and the local community through an increase in assessed valuation, accomplished both through extended motor use and in greater property value.

CLASSIFICATION OF STATE HIGHWAYS.

The varying importance of the roads in the state highway system from the standpoint of state wide necessity and use has shown the need for a classification in order to establish relative importance and provide for a proper rate of progress on the construction of the various parts of the system.

We have chosen the functional use of the routes, rather than present traffic, as a basis of classification. This study has shown the need for some additional roads, elsewhere considered, the omission of which constitute breaks in the lines of primary highway traffic.

Following is a description of the functional subdivisions or units which we have used as a basis and which are later grouped into the classification recommended.

INTERCITY ROUTES.

Into the first class fall those roads which connect our largest centers of population. If we had no state highway system, we would now, just as did the legislature in 1909, conclude that our important roads are those which make possible intercourse from one town to another within the state itself. This class includes roads such as those from San Francisco to Los Angeles, Los Angeles to San Diego, Oakland to Sacramento, Sacramento to Redding, Sacramento to Los Angeles, and other similar sections.

MAJOR INTERSTATE CONNECTIONS.

The second class of highways constitute our major interstate connections, such as from Crescent City to the Oregon line, from Yreka to the Oregon line, from Auburn to Verdi, from San Bernardino to Needles and Topoc, from Coachella to Blythe and from San Diego to El Centro and Yuma.

These interstate connections are important because of the fact that the adjacent states are recognizing the demand of traffic to reach the California borders. We must recognize the responsibility of picking up this traffic at our borders and carrying it to our improved road system within the state.

COUNTY SEAT LATERALS.

The third class, we regard as the county seat laterals, necessary to connect the county seats lying east and west of our main trunk lines. There are still eight county seats unconnected with the main lines, and, inasmuch as there exists a mutual obligation entered into at the time of the first financing of the state highway system to provide highway transportation for the county seats, this class of highway, largely uncompleted, must be given a high order of precedence in our classification.

LATERAL CONNECTIONS BETWEEN TRUNK LINES.

The fourth class, we consider those roads which are necessary to facilitate commercial and pleasure traffic between our population centers and between our parallel main lines of traffic, and in this class we include those natural connections between main lines in the Sacramento and San Joaquin valleys, commonly known as lateral roads, which are located so as to serve best both the coast and valley points.

We do not include all of the laterals as being of equal importance. We are forced to the conclusion that more lateral state highways have been provided than are required to serve the traffic, and we have chosen to include in our fourth class only those which combine favorable location with feasibility of construction, so that they must in the future receive a heavy amount of traffic.

MAJOR RECREATIONAL.

The fifth class includes what may be termed major recreational roads. California comprises many areas of such recreational importance as to be known throughout the world. This is essentially a community where everyone at some time has the opportunity for outdoor recreation. Areas such as the Tahoe region, the Yosemite National Park, the Monterey Bay, the San Bernardino Mountains are famous throughout the country as vacation spots. Traffic is hampered in reaching these areas, and many people are deterred from visiting them on account of highway conditions and traffic congestion. It becomes an important duty of the state to adequately develop roads classed as major recreational in function.

MINOR STATE CONNECTIONS.

The sixth class includes those roads of secondary nature reaching the state's borders. At several points a minor amount of interstate traffic is found, which may in the future, should conditions change in the neighboring state, greatly increase the importance to the state of these connections. However, in view of the fact that we have selected six major points to meet the neighboring states with major highway lines, we believe that pending improvement of these major locations already mentioned in class two, future developments should be awaited before undertaking as a state obligation of equal importance the financing of additional interstate connections.

MINOR RECREATIONAL ROADS.

The seventh class is called the minor recreational roads. We realize that many recreational areas not yet accessible, to which highways have been planned, may in the future become of major importance, yet when considering the matter of priority in construction and the question of state wide financial responsibility for immediate development of these roads, we are forced to the conclusion that the best business arrangement of the highway program is to adequately serve already developed recreational areas sorely in need of better highway facilities, rather than concentrate money, time and energy on the development of locations of less popularity. Many of these minor recreational roads at the present time, subject to only very light traffic, have also an aspect of community importance.

LOCAL DEVELOPMENT ROADS.

The eighth class includes those roads, the improvement of which would bring a benefit more local than state wide. Many of the counties of the state have recognized the importance to them of their roads which are primarily of local benefit, and have assumed the financial obligation of construction or maintenance without calling upon the state. With so much to do and such a large financial outlay facing the state on the construction of lines of communication, about which there can be no contention as to the state wide necessity, it appears that the state should proceed slowly in the improvement of roads of this class until the roads of greater state wide importance have first been built. Local financial contribution is justified on roads of this class. We believe that the inauguration of state maintenance on all unbuilt roads now in the system, so far as they may be open to travel, which we elsewhere recommend, will give this and all other classes of roads in the secondary system a large measure of relief while construction progresses in a fair and orderly manner.

PRIMARY AND SECONDARY CLASSIFICATIONS.

All of the first five classes of road are functionally serviceable to the state as a whole, and, therefore, should properly be financed for construction and maintenance by the state as a whole, regardless of how such finances are raised. The connections between our cities, the connections to our state lines, the county seat connections, the laterals of importance from an economic standpoint, and the roads of major recreational use, development of which will add to California's reputation as a recreational area, all have sufficient importance to the whole state to be considered suitable for state wide financing. The first five classes are therefore thrown into one group designated as the "Primary System."

The five classes of roads in this primary classification have been further subdivided into the two following classes to indicate relative statewide importance:

Primary Class "A" includes the intercity routes and major interstate connections, 2579 miles.

Primary Class "B" includes the county seat laterals, the lateral connections between trunk lines, and the major recreational roads, 2191 miles.

Total primary system, 4770 miles.

This subdivision of the primary classification is shown on the accompanying classification map, and also on the detailed tabulation following.

It is only good business that the development of minor interstate connections should be less rapid than of the major interstate connections. The same applies to the minor recreational roads, and the local development

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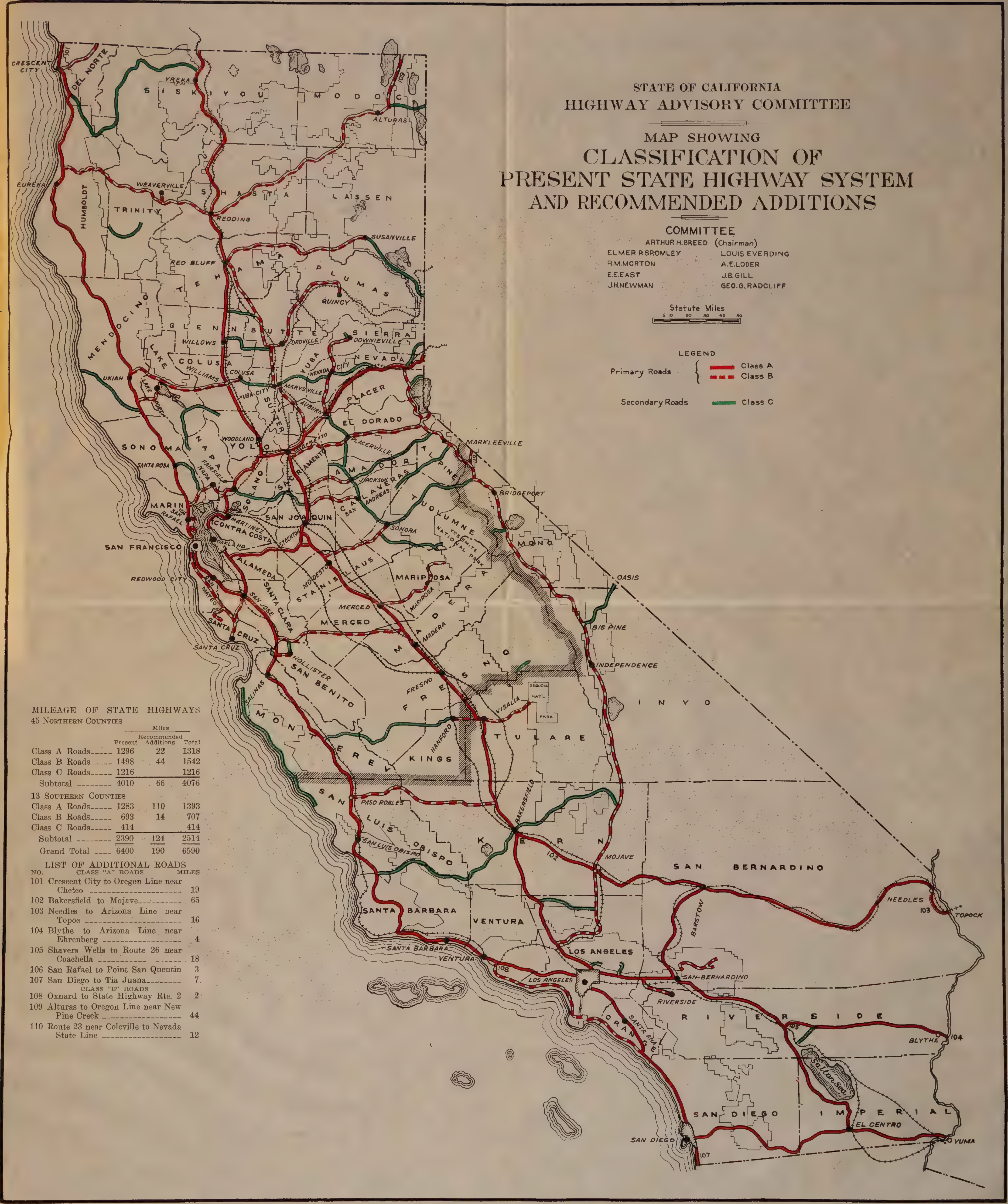

STATE OF CALIFORNIA

HIGHWAY ADVISORY COMMITTEE

MAP SHOWING

CLASSIFICATION OF PRESENT STATE HIGHWAY SYSTEM AND RECOMMENDED ADDITIONS

COMMITTEE

ARTHUR H. BREED (Chairman)

ELMER P. BROMLEY	LOUIS EVERDING
R.M. MORTON	A.E. LODER
E.E. EAST	J.B. GILL
J.H. NEWMAN	GEO. G. RADCLIFF

Statute Miles

5 10 20 30 40 50

LEGEND

Primary Roads { 🟥 Class A
🟥 Class B

Secondary Roads 🟩 Class C

MILEAGE OF STATE HIGHWAYS

	Present	Miles Recommended Additions	Total
45 Northern Counties			
Class A Roads	1296	22	1318
Class B Roads	1498	44	1542
Class C Roads	1216		1216
Subtotal	4010	66	4076
13 Southern Counties			
Class A Roads	1283	110	1393
Class B Roads	693	14	707
Class C Roads	414		414
Subtotal	2390	124	2514
Grand Total	6400	190	6590

LIST OF ADDITIONAL ROADS

NO.	CLASS "A" ROADS	MILES
101	Crescent City to Oregon Line near Chetco	19
102	Bakersfield to Mojave	65
103	Needles to Arizona Line near Topoc	16
104	Blythe to Arizona Line near Ehrenberg	4
105	Shavers Wells to Route 26 near Coachella	18
106	San Rafael to Point San Quentin	3
107	San Diego to Tia Juana	7
	CLASS "B" ROADS	
108	Oxnard to State Highway Rte. 2	2
109	Alturas to Oregon Line near New Pine Creek	44
110	Route 23 near Coleville to Nevada State Line	12

roads; therefore, classes six, seven and eight have been placed in a secondary class, upon which general statewide financing should be limited in some manner equitable to all parts of the state. These routes embrace 1630 miles and are shown on a map attached, and also on the tabulation following. This secondary classification is referred to on map and tabulation as class "C" or "Secondary."

1. *We recommend a classification of the roads in the present highway system into two general systems hereafter designated as primary system and secondary system. Classification has been made in accordance with the importance of the various highways based on their functional use.*

The primary system to consist of:

Class "A"—1. *Intercity highways.*
 2. *Major interstate connections.*
Class "B"—3. *County seat laterals.*
 4. *Other important lateral connections.*
 5. *Major recreational highways.*

The secondary system to consist of:

Class "C"—6. *Minor interstate connections.*
 7. *Minor recreational highways.*
 8. *Local development highways.*

We recommend that the primary system consist of the roads outlined in red and that the secondary system consist of the roads outlined in green upon the maps hereto attached and made a part hereof, which classification is listed in detail on the following tabulation.

RATES OF CLASSIFICATION EXPENDITURES.

A research of the records shows that the direct and distributed expenditures from bond funds and federal aid for new construction from the beginning to June 30, 1924, were located approximately as follows:

Past Expenditures.

On Class A Primary roads	$40,792,996	56%
On Class B Primary roads	25,184,009	34%
Total on Primary roads	$65,977,005	90%
On Class C Secondary roads	7,139,026	10%
Totals	$73,116,031	100%

The foregoing does not include expenditures from small legislative appropriations which were principally upon secondary roads.

We recommend that not less than 75 per cent of construction funds be devoted annually to the construction of the primary Class A and Class B road system until completed.

Under this provision the Highway Commission should, at its discretion, increase the relative expenditures on the primary system beyond this proportion during the first few years or until it has been further advanced.

At the beginning, the problem was to connect the important centers of population, therefore, as shown by the above rates of expenditures, the roads in our two highest classifications have naturally received the largest expenditures. After the main trunk roads had been well advanced increasing expenditures were made on Class B and Class C roads, which still remain farthest from completion.

A summary of the estimated remaining cost of ultimate completion of the present state highway system segregated in accordance with the foregoing classification follows:

Estimated Cost to Complete.

Class A and B Primary roads	$156,347,005	72%
Class C Secondary roads,	60,915,417	28%
Totals	$217,262,422	100%

During the next few years, construction expenditures should be concentrated on the Class A primary roads in sufficient amount to complete at least the initial improvement of grading and gravel or rock surfacing at the earliest possible date and in advance of Class B primary roads, which should at the same time be prosecuted toward completion in similar stages. During this period final pavement will also be necessary on various portions of the primary system as determined by traffic.

In view of the advanced status of construction on the primary roads as compared to the secondary roads, the past rate of expenditures on these two systems will gradually change, decreasing on the primary and increasing slightly on the secondary as the primary system nears completion.

CLASSIFICATION OF STATE HIGHWAY SYSTEM.

Route	Description	Primary		Secondary	Total
		Class A	Class B	Class C	
		Inter-city routes. Major state connections	County seat laterals. Necessary laterals. Major recreational roads	Local development roads. Minor state connections. Minor recreational roads	
1	San Francisco to Oregon Line via Crescent City	363	42		405
2	San Francisco to San Diego (Coast Route)	500			500
3	Sacramento to Oregon Line	180	117		297
4	Sacramento to Los Angeles (Valley Route)	358			358
5	Stockton to Santa Cruz via Oakland	84	33		117
6	Woodland Junction to Sacramento	15			15
3 & 7	Benicia to Red Bluff via West Side	165			165
8	Ignacio to Cordelia		38		38
9	San Fernando to San Bernardino	57			57
10	San Lucas to Sequoia National Park via Hanford		47	100	147
11	Sacramento to Nevada State Line via Placerville		104		104
12	San Diego to El Centro	114			114
13	Salida to Route 23 via Sonora Pass		49	82	131
14	Oakland (Albany) to Martinez	22			22
15	Route 1 near Calpella to Cisco		95	85	180
16	Hopland to Lakeport		19		19
17	Roseville to Nevada City via Auburn	15	25		40
18	Merced to El Portal		70		70
19	Claremont to Riverside		18		18
20	Redding to Route 1 near Arcata via Weaverville		157		157
21	Route 3 near Richvale to Quincy		90		90
22	San Juan Bautista to Route 32 via Hollister		7	8	15
23	Saugus to Alpine Junction via Bridgeport		440		440
24	Route 4 near Lodi to Route 23 via San Andreas and Big Trees		37	52	89
25	Nevada City to Downieville		46		46
26	San Bernardino to El Centro	149			149
27	El Centro to Yuma	58			58
28	Redding to Nevada State Line via Alturas		147	28	175
29	Red Bluff to Nevada State Line via Susanville		107	52	159
30	Abandoned.				
31	San Bernardino to Barstow	77			77
32	Gilroy to Route 4 near Califa		84		84
33	Route 4 near Bakersfield to Paso Robles		94		94
34	Route 4 near Arno to Picketts Junction via Jackson		34	72	106
35	Peanut to Kuntz			31	31
36	Downieville to Mt. Pleasant			6	6
37	Auburn to Nevada State Line via Truckee and Dog Valley	77		22	99
38	Myers to Nevada State Line via Truckee Canyon	19	48		67
39	Tahoe City to Nevada State Line			12	12
18 & 40	Keystone to Mono Lake via Tioga Pass and Yosemite Park			74	74
41	General Grant Park to Kings River Canyon			20	20
42	Saratoga Gap to Redwood Park		20		20
43	San Bernardino to Big Bear Lake		51		51
44	Redwood Park to Boulder Creek		8		8
45	Willows to Route 3 north of Biggs			30	30
46	Mouth of Klamath River to Route 3 at Klamath River Bridge			189	189
47	Orland to Chico			17	17
48	McDonald to Navarro			51	51
49	Calistoga to Lower Lake			31	31
50	Lower Lake to Rumsey			25	25
51	Santa Rosa to Shellville			23	23
52	Tiburon to Alto	5			5
53	Fairfield to Lodi via Rio Vista			55	55
54	Michigan Bar to Central House			9	9
55	San Francisco to Route 5 near Woodwardia		61		61
56	Carmel to Cambria			108	108
57	Santa Maria to Freemans via Bakersfield			212	212
58	Mojave to Needles via Barstow	240			240
59	Lancaster to Baileys			37	37
60	Oxnard to San Juan Capistrano		103		103
61	La Canada to Mt. Wilson Road			25	25
62	Azusa to Pine Flats			28	28
63	Big Pine to Oasis			41	41
64	Mecca to Blythe	77		15	92
65	Auburn to Sonora (Mother Lode Highway)			87	87
66	Manteca to Mossdale School	4			4
67	Route 2 near San Juan to Pajaro River Bridge (Chittenden Road)			3	3
	Totals (Present State Highway System)	2,579	2,191	1,630	6,400

RECOMMENDED ADDITIONS.

Route	Description	Primary		Secondary	Total
		Class A	Class B	Class C	
		Inter-city routes. Major state connections	County seat laterals. Necessary laterals. Major recreational roads	Local development roads. Minor state connections. Minor recreational roads	
101	Crescent City to Oregon Line near Chetco	19			19
102	Bakersfield to Mojave	65			65
103	Needles to Arizona Line near Topoc	16			16
104	Blythe to Arizona line near Ehrenberg	4			4
105	Coachella to Shaver's Wells	18			18
106	San Rafael to Point San Quentin	3			3
107	San Diego to Tia Juana	7			7
108	Oxnard to State Highway Route 2		2		2
109	Alturas to Oregon line near New Pine Creek		44		44
110	Route 23 near Coleville to Nevada State Line		12		12
	Totals (Recommended additions)	132	58		190
	Grand totals	2,711	2,249	1,630	6,590

SUMMARY OF MILEAGE IN NORTHERN AND SOUTHERN COUNTIES.

	Class						Totals	
	A		B		C			
	Miles	Per cent	Miles	Per cent	Miles	Per cent	Miles	Per cent
Forty-five northern counties:								
Present State Highway System	1,296	50	1,498	68	1,216	75	4,010	63
Recommended additions	22	17	44	76			66	35
Totals	1,318	49	1,542	69	1,216	75	4,076	62
Thirteen southern counties:								
Present State Highway System	1,283	50	693	32	414	25	2,390	37
Recommended additions	110	83	14	24			124	65
Totals	1,393	51	707	31	414	25	2,514	38

ELIMINATION OF ROADS.

After due consideration, the committee is unable to agree on a recommendation that steps should at this time be taken toward eliminating any of the roads in the state highway system.

There are sections of road which members of the committee believe should not be a part of the state highway system. Some of these sections are established as state highways by constitutional amendment approved by a vote of the people, and we do not, at this time, recommend additional constitutional amendments to remove them from the highway system.

In so far as roads, which members of the committee believe to be of doubtful importance, were introduced into the system by legislative enactment only, and without major financing provisions, elimination could be accomplished by action of the legislature without a vote of the people. In these cases the small appropriations have prevented expenditure of any material amounts upon them.

At such time as there has been created a definite public opinion in the state as to what should properly constitute a state highway, constitutional amendments should be submitted to the people that they may determine the limitations of the state highway system and what roads should be eliminated.

At many of our conferences, we have discussed the indefinite situation pertaining to the designation of the county seat lateral connecting Quincy, county seat of Plumas County, with the Sacramento Valley highway. The expense of constructing an adequate highway through the Feather River Canyon, one of the additional routes named in the third bond issue, in the face of the existing natural and artificial obstructions, would be out of proportion to the benefits to be derived by the opening of such a highway. The authority to designate another route as a county seat lateral is still vested in the Highway Commission, according to the provisions of the first bond act. The solution of this problem should be made by the Highway Commission and should be based on their estimates of cost of the two routes considered against the ultimate utility of the road.

ADDITIONAL ROADS.

The committee on its tours of the state has found that, with few exceptions, communities are asking for additional roads to be added to the state highway system.

We have been requested to recommend the addition of more than 3000 miles of road, which would probably cost $117,000,000, estimated from the very meager data at hand. These roads are shown on the accompanying map of "roads asked for and roads recommended."

A list of the additional roads presented to the committee for consideration is set forth in Appendix H of this report, with a brief description of each and approximate lengths.

We find that the roads presented to the committee are of widely varying importance from a statewide standpoint. In a majority of cases they are predominantly of local importance and of very little importance from a statewide traffic standpoint.

We can find no justification for the state, under the present financial conditions, undertaking responsibility for the construction and maintenance of improvements of major local value and very minor statewide importance.

In so far as some of these lines of road serve to relieve overcrowded traffic on existing state highways, or open up new lines of through traffic which might in time become of state wide importance, they are worthy of consideration. As soon as the state can provide finances of sufficient amount for their construction, after making ample provision for roads already in the system, a few of the most important of these proposed roads should be considered for addition to the state system, provided they can be added under conditions which may be just and equitable to the various sections of the state.

The inclusion of additional roads without additional financing, as has been done in the past, prior to the time that our present primary trunk system is completed, will further postpone for many years the completion of roads of state wide importance. This would mean temporary defeat of the purpose for which the state highway system was created.

Our classification study of the state highway system brings out the fact that it is necessary to add certain highways for the purpose of closing obvious gaps in the various routes, thus providing for the more economic and efficient operation of traffic on the primary road system.

To this end we recommend that the following ten roads be made state highways, and classified as a portion of the primary system:

Class A Primary.

1. Crescent City to the Oregon line, near Chetco, Coast route, 19 miles.
2. From Bakersfield to Mojave, 65 miles.
3. From Needles to Arizona line near Topock, 16 miles.
4. From Blythe to Arizona line near Ehrenberg, 4 miles.
5. From Shavers Wells to Route 26 near Coachella, 18 miles.
6. San Rafael to Point San Quentin, 3 miles.
7. From San Diego to Tia Juana, 7 miles.

Class B Primary.

8. From Oxnard to the main coast highway, 2 miles.
9. Alturas to the Oregon line near New Pine Creek, 44 miles.
10. From Route 23 near Coleville to the Nevada state line, 12 miles.

The following is a description of each of these roads, with reasons for its addition:

1. From Crescent City to the Oregon line near Chetco, via the Coast road, known as the Redwood highway. This is a primary federal aid route. The state of Oregon is fast pushing to completion the main line highway from Marshfield, Oregon, down the coast to connect at the California line, and this section should be added in order to complete the Redwood highway to the Oregon line, where it will connect with the Roosevelt highway up the Oregon coast.

2. The section from Bakersfield to Mojave should be added as affording an outlet from the San Joaquin Valley, as well as all of cen-

tral California, to the national old trails transcontinental route via Barstow and Needles to the Arizona state line near Topock. This route is a necessary addition to accommodate interstate traffic and afford an all winter highway from central California to the east.

3. The section of highway from Needles to the Arizona line near Topock is obviously an error in previous legislative road description. This road had previously been described as terminating at Needles, and thus does not reach the Arizona state line. The bridge over the Colorado River is located 16 miles south of Needles and at the present time can not be reached except over a county road. All of the transcontinental travel coming to California over the national old trails highway uses this section, which should be now added to the system.

4. Blythe to the California line near Ehrenberg. By error in previous legislative description, the eastern terminus of the Mecca-Blythe road is named as Blythe. The terminus should be the Colorado River, which is four miles further east than Blythe. This section should be added to the state highway system.

5. From Shavers Wells to Route 26 near Coachella. The western termination of the existing Mecca-Blythe state highway route at Mecca does not constitute a feasible state highway location. The route, instead of specifying Mecca, should continue from Shavers Wells westerly to a connection with the state highway near Coachella, about 18 miles. This section should, therefore, be added to the state highway system. By this addition, the route from Coachella by Thermal Canyon and the Chuckawalla Valley is a feasible road location, and reduces the distance between Los Angeles and Phoenix about 10 miles over an easy direct location.

6. San Rafael to Point San Quentin. This section of road serves essentially as a connection from the Redwood highway to the eastbay cities ~~of~~ Oakland, Berkeley and Richmond by way of the Richmond-San Rafael Ferry, and thus makes it possible for the eastbay communities to reach the Redwood highway by one ferry instead of two. It should be added to the state highway system.

7. From San Diego to Tia Juana. This section of road should be added to the state highway system as an international connection from California to Mexico, there being no state highway thus far established providing highway connection with Mexico. This road extends in Mexico, down the coast for at least 90 miles, and will undoubtedly be extended further. There is now heavy traffic on this road.

8. From Oxnard to the main Coast highway. This section should be added in order to close the 2-mile gap between the Coast highway and the northerly end of the Oxnard-Capistrano road and thereby correct the erroneous description under which the Oxnard-Capistrano road was added to the state highway system.

9. From Alturas to the Oregon line near New Pine Creek should be added to the state highway system in order to effect an interstate connection with the state highway system of Oregon and serve a route of growing interstate importance.

10. From Route 23 near Coleville to the Nevada state line in Mono County. This section should be added to the Class B Primary system to afford an interstate connection from Route 23, near Coleville, thus serving the main line of travel from Los Angeles by way of the Owens Valley to Reno and Lake Tahoe region. It is needed in order to connect with a road on the Nevada state highway system reaching the California line at this point.

We recommend that no other additions be made to the primary system, and that any additional roads which, in the opinion of the legislature, should be included in the state highway system prior to the completion of the primary system, be classified into the secondary system.

The committee is unwilling to recommend any further additions, although not disputing the merit of some of the roads requested, because of the magnitude of our obligation on the present highway system.

FUTURE PROCEDURE FOR ADDING ROADS.

Under the existing system pertaining to requests for legislative enactment adding roads to the state highway system, there is usually a deplorable absence of specific data

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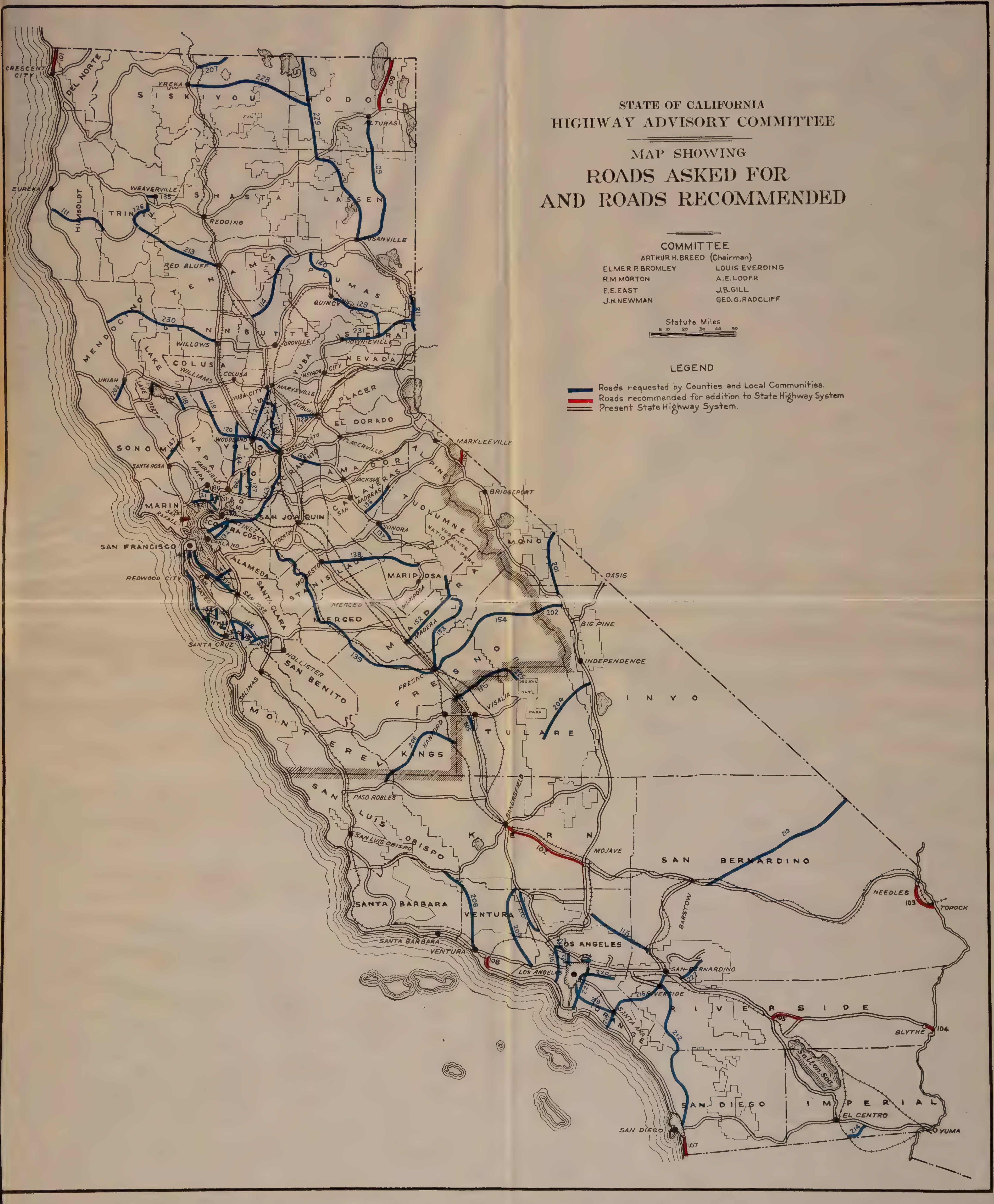


STATE OF CALIFORNIA
HIGHWAY ADVISORY COMMITTEE

MAP SHOWING
ROADS ASKED FOR AND ROADS RECOMMENDED

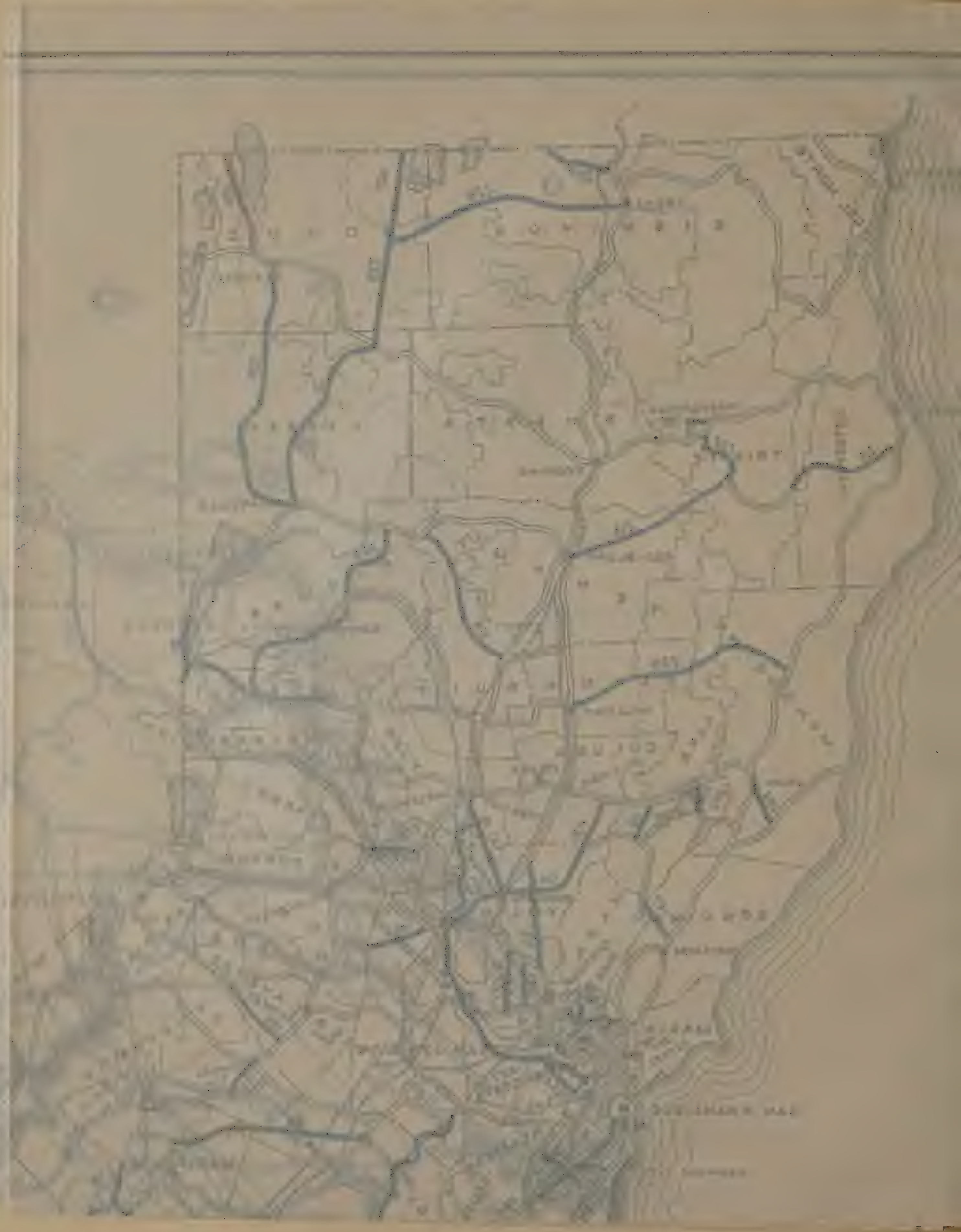
COMMITTEE
ARTHUR H. BREED (Chairman)

ELMER P. BROMLEY	LOUIS EVERDING
R.M. MORTON	A.E. LODER
E.E. EAST	J.B. GILL
J.H. NEWMAN	GEO. G. RADCLIFF

Statute Miles
5 10 20 30 40 50

LEGEND

▬ Roads requested by Counties and Local Communities.
▬ Roads recommended for addition to State Highway System
═ Present State Highway System.



in regard to the proposed roads. The legislature is called upon to place roads in the highway system for either survey, maintenance or construction with, in most cases, no data to guide them as to the responsibility the state would undertake by the inclusion of these roads.

A method should be set up whereby the district or county asking for the inclusion of an additional road, should make surveys, plans and reports on the proposed road in a manner adequate to deduce estimates of probable ultimate cost of the project. Reports should include statements as to standards of construction considered necessary, construction quantities, etc.

These surveys, plans and estimates should be submitted in prescribed form to the California Highway Commission, whose duty it should be to submit to the legislature at the next succeeding session, the county's report, with their own comments, together with their recommendations as to the importance of the project, and its proper classification in the highway system.

We recommend as a procedure for adding roads to the system, that any district or county asking for the inclusion of additional roads to the highway system, should make survey, plans and estimates of the cost of same in proper form and submit to the California Highway Commission, which, in turn, should submit the same to the first succeeding session of the legislature with its recommendations as to importance and classification.

FINANCING.

State highway construction in the past has been financed from bond issues and federal aid. Now that bond funds are exhausted, some fair and practicable method of financing the remaining new construction must be selected if work is to continue.

If roads are to be built, they must sooner or later be paid for by the people of the state. Taxpayers have never been enthusiastic over paying any form of taxes, but they are insisting upon having the roads. Therefore, it becomes a case of selecting from the various available methods of taxation that method which will prove to be the most equitable and come the nearest to being popular with the people who pay.

THE BENEFIT PRINCIPLE.

The earlier forms of taxation used the principle of "ability to pay," but later the principle of "benefit" was injected into taxation methods and now generally prevails along with the ability principle. No method has ever been evolved which fully harmonized the requirements of both principles. In some cases one predominates and in some cases the other rules. The benefit principle is the one which now appeals to the average citizen as the more equitable, provided ability to pay is at the same time recognized. Both are frequently difficult of application to the satisfaction of all.

The building of all state highways and all county roads of general motor use will produce either direct or indirect benefits, which have been classified as follows:

(a) Benefits to all functions of organized society in general.

(b) Benefits to definite groups, such as labor, agriculture and the various industries.

(c) Benefits to property served.

(d) Benefits to the road user.

It is impossible to determine the relative amount of benefit derived by each of these classifications or groups.

Every individual benefits indirectly through each, but his direct benefits can usually be found predominantly in one. The direct benefit to groups, as well as individuals, becomes apparent with increasing certainty and in increasing amount as we proceed down the list from the (a) to the (d) classification. Therefore, in taxation for roads the benefits have usually been assessed to the general public, to property, and to the road user.

Before the automobile began to demand enormous road building programs and expensive roadways, the benefits were assessed to the general public or directly to property, but in much the larger proportion to property, because of its accessibility. This practice of taxing property continued until the burden of taxation has become so tremendous as to now be the subject of nation-wide investigations, and general demands for retrenchment. Property taxation has been rapidly increased in the past few years, both by increased assessments and increased tax rates, until it has been estimated by the United States Department of Agriculture that 86 per cent of the total net profits for agriculture in the United States is required for taxes.

The demand of road users for such large road building programs as they find necessary and profitable in highway transportation has resulted in a gradually increased tax upon the road user. And still the rate of building road facilities, all over the country, is far behind the rate of increase in number and use of motor vehicles.

It would be unjust and impracticable to assess the entire modern road budget to any one of the four above classes of beneficiaries. However, the rapid growth taking place in highway transport, and the demand for a large mileage of expensive roads, where formerly property was reasonably served with cheap, narrow, winding wagon road, makes it equitable as well as necessary to place upon the user of the road a largely increased proportion of the total expense. This is essential if the users of highway rolling stock are to pay a reasonable part of the expensive roadbeds which they call upon the public to provide.

WHO HAS BEEN PAYING THE ROAD BILL?

Due to the peculiar system of taxation in California whereby state revenues are all realized from taxes upon public utilities and other corporations, and county revenues are derived from taxes on real and personal property, it is necessary to consider both state and county road systems in connection with methods of financing either system.

The Bureau of Public Roads census indicates that the combined state and county road systems of California to June 30, 1923, contained 7021 miles of hard-surfaced roads, one-third of which had been improved with bituminous macadam and two-thirds with higher type pavement, while an additional 7400 miles had been surfaced with gravel or macadam. To a date one year later, the state had paved a total of only 2077 miles and had improved an additional 1366 miles with gravel or macadam. This is evidence of the fact that the counties have also made heavy expenditures, mostly from property taxes, for improved roads used by motor vehicles.

The following tabulation, compiled from the reports of the State Highway Department and the State Controller's office, shows the amount of the combined road expenditures of state and counties for construction and maintenance for twelve fiscal years ending June 30, 1923.

TOTAL STATE AND COUNTY EXPENDITURES FOR CONSTRUCTION AND MAINTENANCE OF STATE AND COUNTY ROADS AND BRIDGES.

Showing General Source of Funds.

(Not including San Francisco County.)

			General sources of revenue			
			Motor Vehicles		General Taxation	
Organizations	Fiscal year ending June 30	Total expenditures for roads and bridges	Amount	%	Amount	%
Counties	1912	$6,228,526				
"	1913	9,495,281				
"	1914	9,615,882				
"	1915	12,489,799				
"	1916	16,106,469				
"	1917	15,059,232				
"	1918	14,649,867				
"	1919	12,350,569				
"	1920	14,850,762				
"	1921	25,749,867				
"	1922	24,624,643				
"	1923	21,944,147				
Counties total		$183,165,044	*$20,972,527	11.4	$162,192,517	88.6
State total, fiscal years 1912-23		86,227,313	15,994,837	18.6	70,232,476	81.4
Grand total		$269,392,357	$36,967,364	13.7	$232,424,993	86.3

*Total apportionment to counties to June 30, 1923, but not all expended.

The foregoing shows that, of the total expenditures for the period, 13.7 per cent was derived from motor vehicles or the user, while 86.3 per cent was derived from general taxation.

The following analysis makes a further subdivision of the sources from which these funds were derived.

ANALYSIS OF EXPENDITURES FOR CONSTRUCTION AND MAINTENANCE OF STATE AND COUNTY ROADS AND BRIDGES SHOWING SOURCE OF REVENUE FISCAL YEARS 1912 TO 1923, INCLUSIVE.

Item	Grand total expenditure from all sources	From tax on motor vehicles	Total from general tax	Source of General Taxes		
				State corporation tax	Property tax	Federal aid
State highway bonds	$62,274,097		$62,274,097	$62,274,097		
Legislative appropriations	378,199		378,199	378,199		
Federal aid	6,556,123		6,556,123			$6,556,123
County contributions to state	1,024,057		1,024,057		$1,024,057	
County expenditures	162,192,517		162,192,517		162,192,517	
Motor vehicle taxes—counties	20,972,527	*$20,972,527				
Motor vehicle taxes—state	15,994,837	15,994,837				
Totals	$269,392,357	$36,967,364	$232,424,993	$62,652,296	$163,216,574	$6,556,123
Percentages of total	100%	13.7%	86.3%	23.3%	60.6%	2.4%

*Total apportionment to counties to June 30, 1923, but not all expended.

It is noted that of the total funds expended 23.3 per cent was derived from, or will be ultimately paid by, state corporation taxes, which are passed on to the general public; 60.6 per cent was derived from taxes upon property, and 2.4 per cent was derived from federal aid which comes from the general revenue of the United States, making the total of 86.3 per cent paid from general taxation and 13.7 per cent from taxes on the motor vehicles or user. Of the state's tax revenue from corporations approximately 69 per cent come from railroads and other public utilities.

Total county expenditures are not available for the fiscal year ending June 30, 1924, but if we take the actual expenditures of the state for the same period and a conservative estimated total expenditure for the counties, analyzing the figures in the same manner as the foregoing tabulations, we find the following estimated percentages for the fiscal year 1924:

From state corporation taxes	18.4%
From property taxes	48.9%
From federal aid	6.8%
Total from all general taxation	74.1%
Total from motor vehicles or the user	25.9%

The average gross tax in California per registered motor vehicle, including trucks, for registration and gas tax for the past year was $14.17. Under the assumption of a lower average use of gasoline as later explained in this section the average tax for privately owned pleasure cars was approximately $10.60. Provided recommendations elsewhere made in this report for an increased construction fund of $10,000,000 in 1926 to be derived from motor vehicle sources should become effective, the average increased rate per motor vehicle for all classes, according to our registration estimate for 1926, necessary to produce such a fund would average $6.25 per vehicle, including trucks, or an increase of 44.1 per cent above the average motor vehicle tax now in effect, all to go to the state.

If such a method of financing new state work should be adopted, general taxation would still be paying a large part of the total annual state and county road expenditure. A large proportion of this would inevitably fall upon property, which is the only practical means of raising revenue available to the counties for carrying on their road program, aside from revenue they receive from the one-half of the present motor vehicle and gasoline taxes, which were accounted for in the above analysis.

The foregoing studies of source of revenue expended on state and county roads does not include street pavements or roadways within incorporated cities. Such improvements are for the most part paid for by property in the form of annual taxes, bonds or direct frontage assessments. If the total expenditure for these improvements for the two periods analyzed above were available and added, they would largely increase the percentage of the total bill for roadways paid by property and correspondingly decrease the total percentage during each of these periods paid from taxation of motor vehicles. The fact that the benefits derived from street improvements within cities can be traced more directly to the property, makes it more reasonable to assess the cost of the improvement to the property, than in the case of a road through country districts.

METHODS OF FINANCING CONSIDERED.

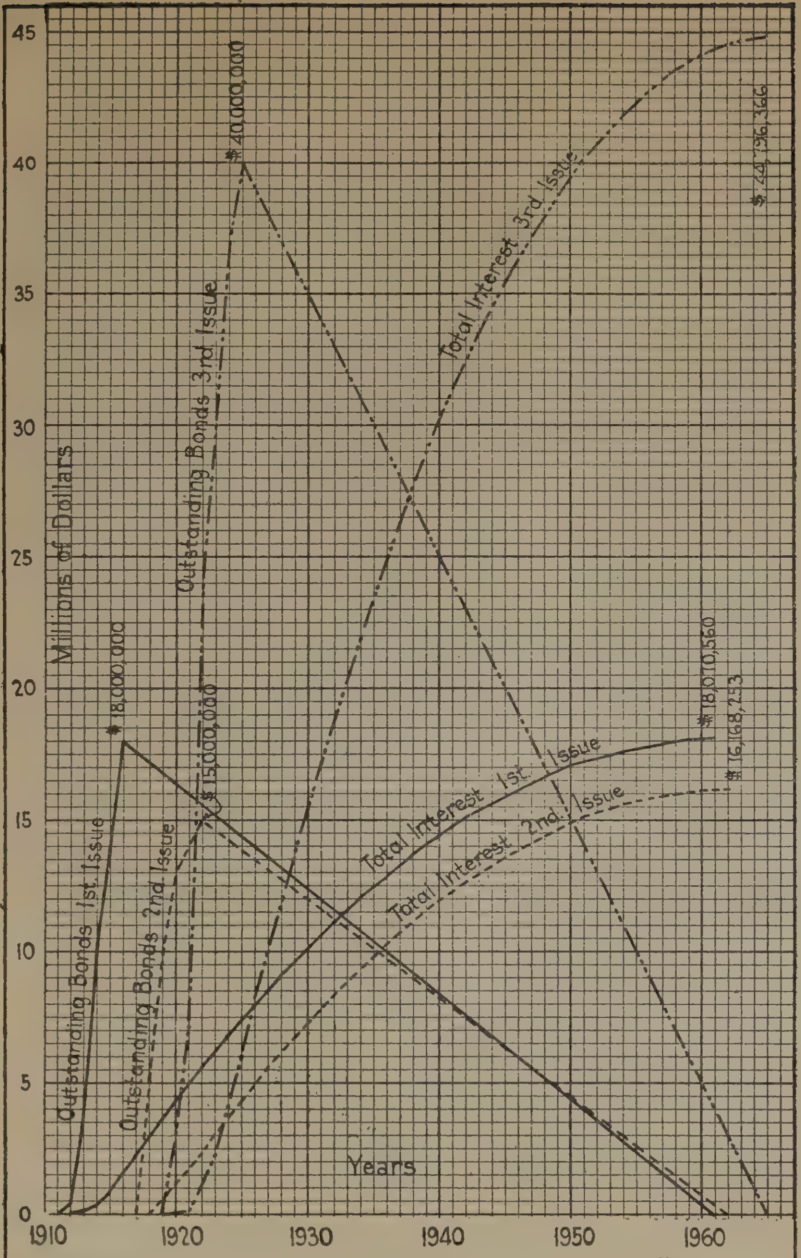
Under existing methods of taxation in this state the following four general methods of financing the completion of the state highway system may be considered available:

1. General state bond issue.
2. Ad valorem tax on property.
3. Direct legislative appropriation.
4. Increased tax on motor vehicles, either through
    (a) Plate tax.
    (b) Weight tax.
    (c) Gasoline tax.

BONDS.

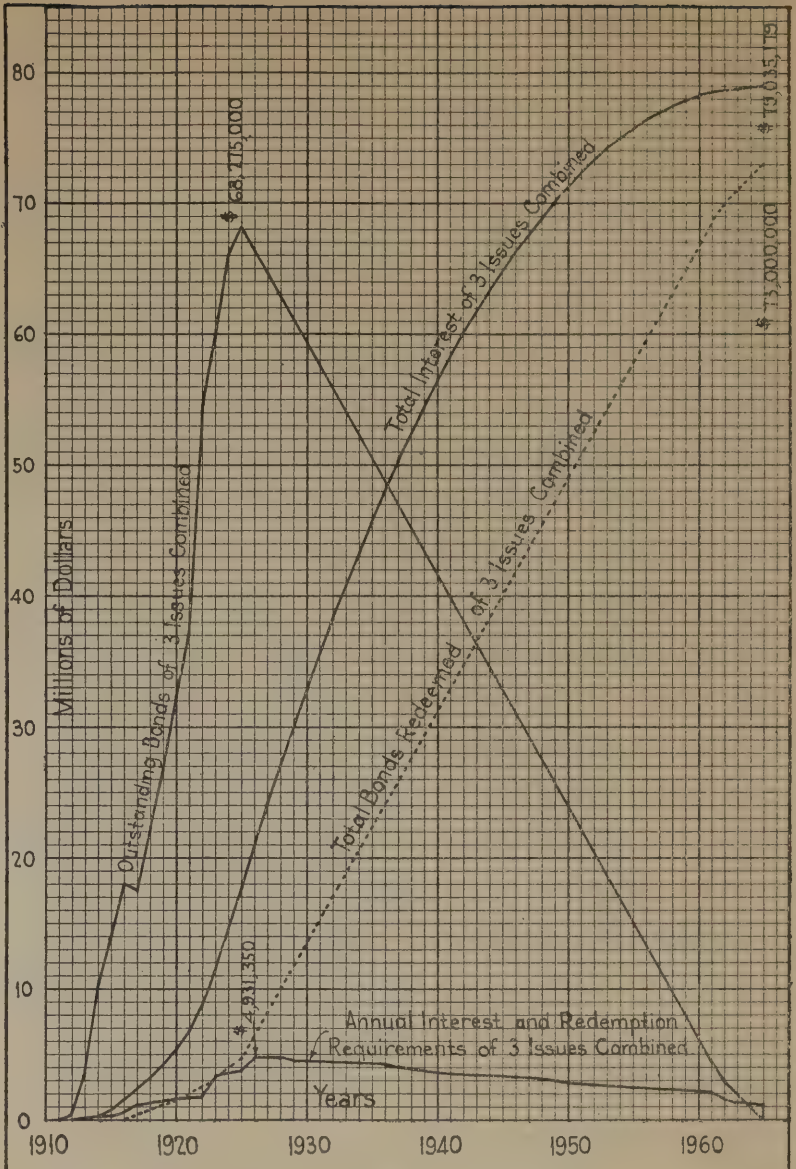
The three past state bond issues, totaling $73,000,000, are deferred payment serial type, with payment periods of 40 and 45 years. The peak of combined payments for all bond issues will be reached in 1926, with the payment of $4,931,530 for interest and sinking fund. The rate of annual payments on the three bond issues combined is shown by charts on the opposite page. The cost of all bond issues for principal and interest will reach $152,035,179 and payment period will extend to 1965. The curves on the opposite page show outstanding bonds and total interest at end of each fiscal year for each issue.

Your committee has considered the further issuance of bonds. We make recommendation elsewhere in this report for the issuance of $25,000,000 of bonds, exclusively for bridge and railroad grade separation construction. These should be of serial type, payment period extended over 25 years, deferred payment period 5 years, total term 30 years. The construction of these improvements is considered so urgent and the improvement so permanent as to justify a special and sure means of financing on the primary system.



NOTE: Each horizontal line represents one half million dollars.
Each vertical line represents one year.

CURVES SHOWING OUTSTANDING BONDS AND TOTAL INTEREST AT END OF EACH FISCAL YEAR



NOTE: Each horizontal line represents one million dollars.
Each vertical line represents one year.

CURVES SHOWING STATUS OF THREE BOND ISSUES COMBINED AT END OF EACH FISCAL YEAR

There are elements introduced in bond methods of procedure which should not be overlooked. These elements tend to reduce the efficiency of the operations, as well as to prevent the concentration of funds on primary roads.

The curves below show the fluctuation in annual expenditures and rate of annually completed mileage as recorded to June 30, 1924. This fluctuating rate of expenditure has prevented the construction forces of the state, including contractors as well as the State Highway Department, from maintaining their business on the most efficient basis. Modern highway construction is a highly specialized business, and the experience of the various individuals who engage on this project, whether contractors or engineers, should remain available for the state to obtain greatest efficiency in operation.

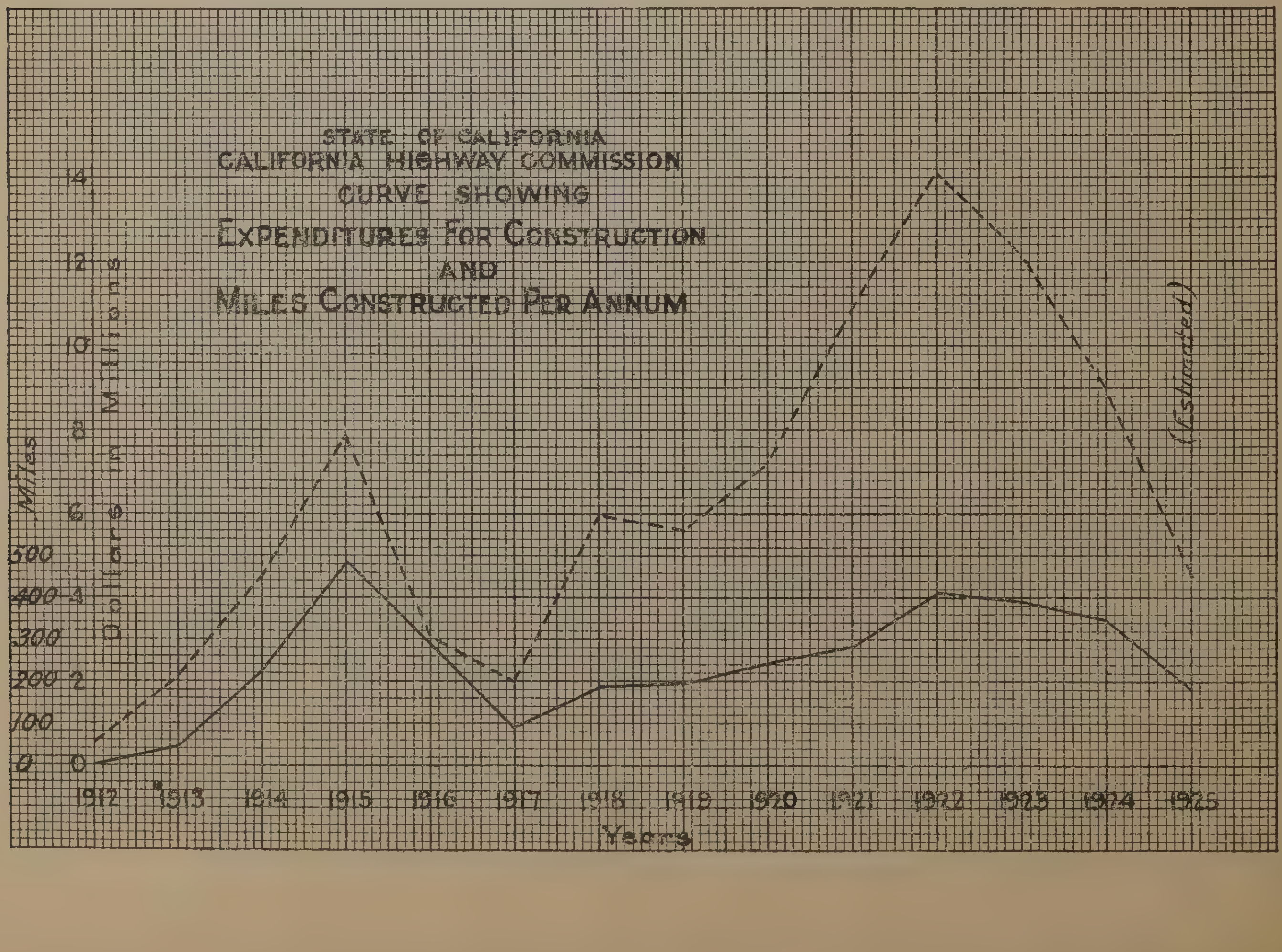
Millions of dollars of future expenditure for maintenance and for rebuilding the roads depends upon the efficiency with which each piece of work is accomplished. When this aspect is considered, and if highway building is to continue for ten or more years, this is a matter of serious moment.

The curves on the opposite page show the relation of annual expenditures to annual payments for principal and interest.

Bond financing in the past has been popularized by the adding to the highway system of some roads which we can not find to be of statewide necessity. The inclusion of these roads has diverted funds to some extent from the original purpose for which the state highway project was undertaken, and from the only purpose which justifies construction of highways by a state agency at general state expense. This purpose must be admitted to be for the building of highways which are essential to the welfare of the majority of the people of the state.

It is reasonable to assume that additional bonds issued for road construction would carry with them the same features as in the past, which would again tend to destroy the economic justification for general statewide financing of highways.

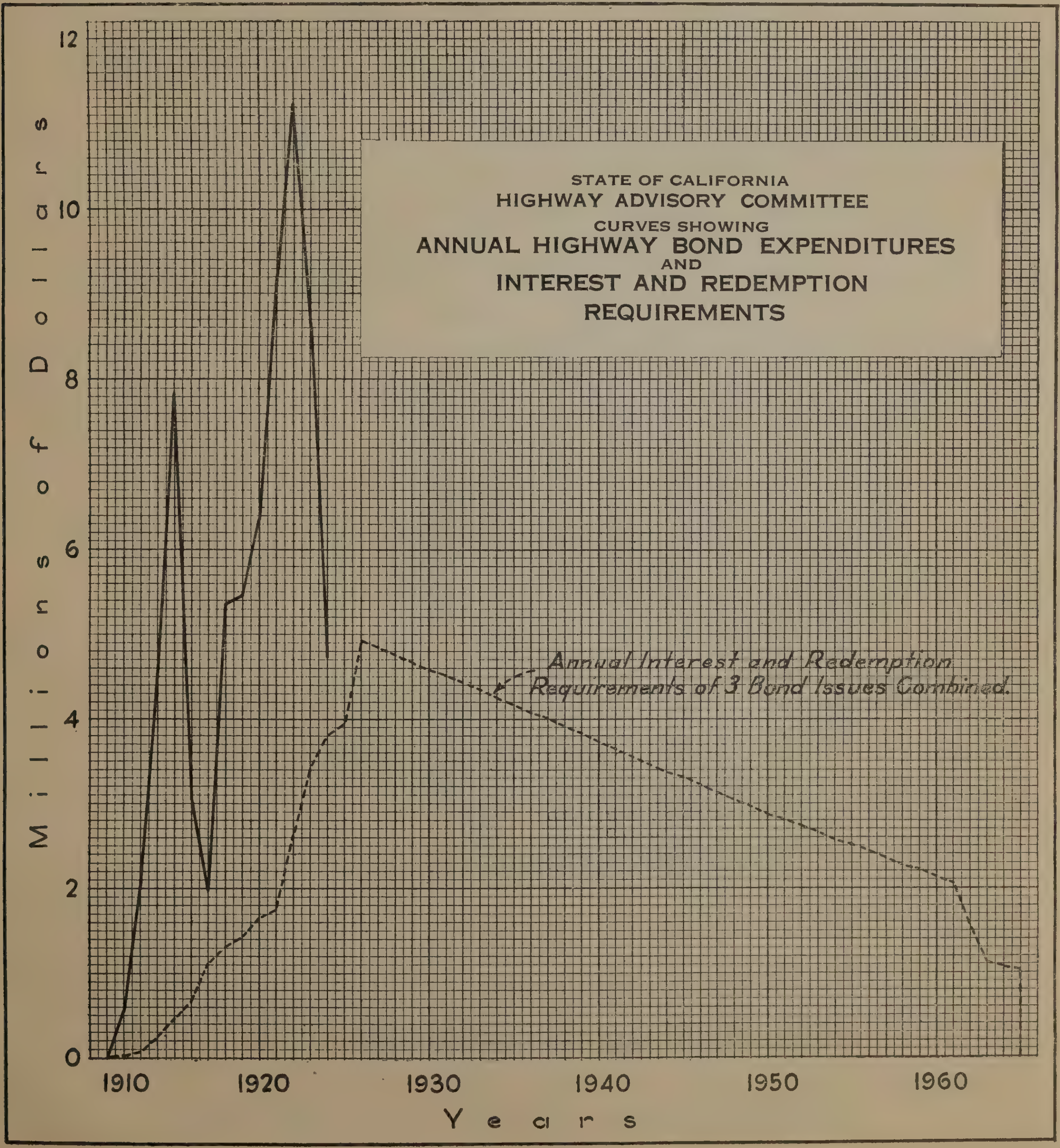
There is no unsoundness in the bond method



of financing highway improvement. If other and less expensive sources of income were not considered readily available and more equitable, the issuance of additional bonds in successive stages to defray the cost of all initial construction would doubtless be here recommended as the best means of financing the construction of at least that portion of our highway system classified as Primary.

The principal and interest on bond issues for state highways would be paid from state corporation tax and passed on to the people, making it a general tax. This would be an equitable means of financing a portion of the work, but our analysis of who pays the road bill indicates that it would probably not be fair to place the entire future construction costs upon such a source of revenue, considering the increasing degree in which the benefits are accruing directly to the user.

In view of the fact that $133,404,550 remain to be paid for principal and interest on the existing bond issues after the close of the fiscal year 1924 for roads already constructed, and



in view of the general desire of the people to reduce rather than increase rates of general taxation, we believe that, for the present at least, a sufficient additional burden will be placed upon this source of revenue by the $25,000,000 new bond issue which we recommend for major bridges and railroad grade separations. Later, under improved conditions, it would be reasonable to consider further bond issues, provided sufficient funds can not be realized on the "pay-as-you-go" basis.

For the purpose of study there is shown on the opposite page the essential data for a typical $100,000,000 bond issue on the basis of 4½ per cent interest, bonds to be sold at the rate of $10,000,000 per year covering a period of 10 years, and all bonds to be retired within 25 years from date of first retirement, which would begin five years after first issue.

Such a plan would permit a uniform expenditure of $10,000,000 annually for 10 years and in the year 1937 the total principle and interest due to be paid on this bond issue alone would be $8,135,201, which added to the total of $4,008,400 for principal and interest due in the same year on the first three bond issues would make a total of $12,143,601 to be paid from state taxation. This would fall at approximately the time the last of the $100,000,000 bond issue had been expended. The state would then be carrying a large annual payment on bonds and would at the same time have to plan additional financing, possibly in a larger amount. The total ultimate cost of such a bond issue for interest and principal would be $159,620,274.

AD VALOREM TAX.

All general state taxes under our present laws are raised by a levy on corporations. However, the legislature has power to direct that a general ad valorem tax be levied on the property of the various counties of the state to augment the revenues from corporation taxes in the event they prove inadequate, and it would, therefore, be possible to levy such a tax for building state highways. To this method of financing future highway construction the committee takes objection because the foregoing analysis of who pays the road bill indicates that such a method would place an undue proportion of the total road burden on property; therefore we have not recommended it.

LEGISLATIVE APPROPRIATION.

State revenues are derived from corporations, and it can be assumed that additional taxation is immediately passed back to the customers of the corporations and through them to the general public.

The best reports available from the Board of Control and the State Board of Equalization indicate that the general expense of state government, excluding highway expenditures, has already reached a figure dangerously close to the state's income, as provided through existing revenue measures.

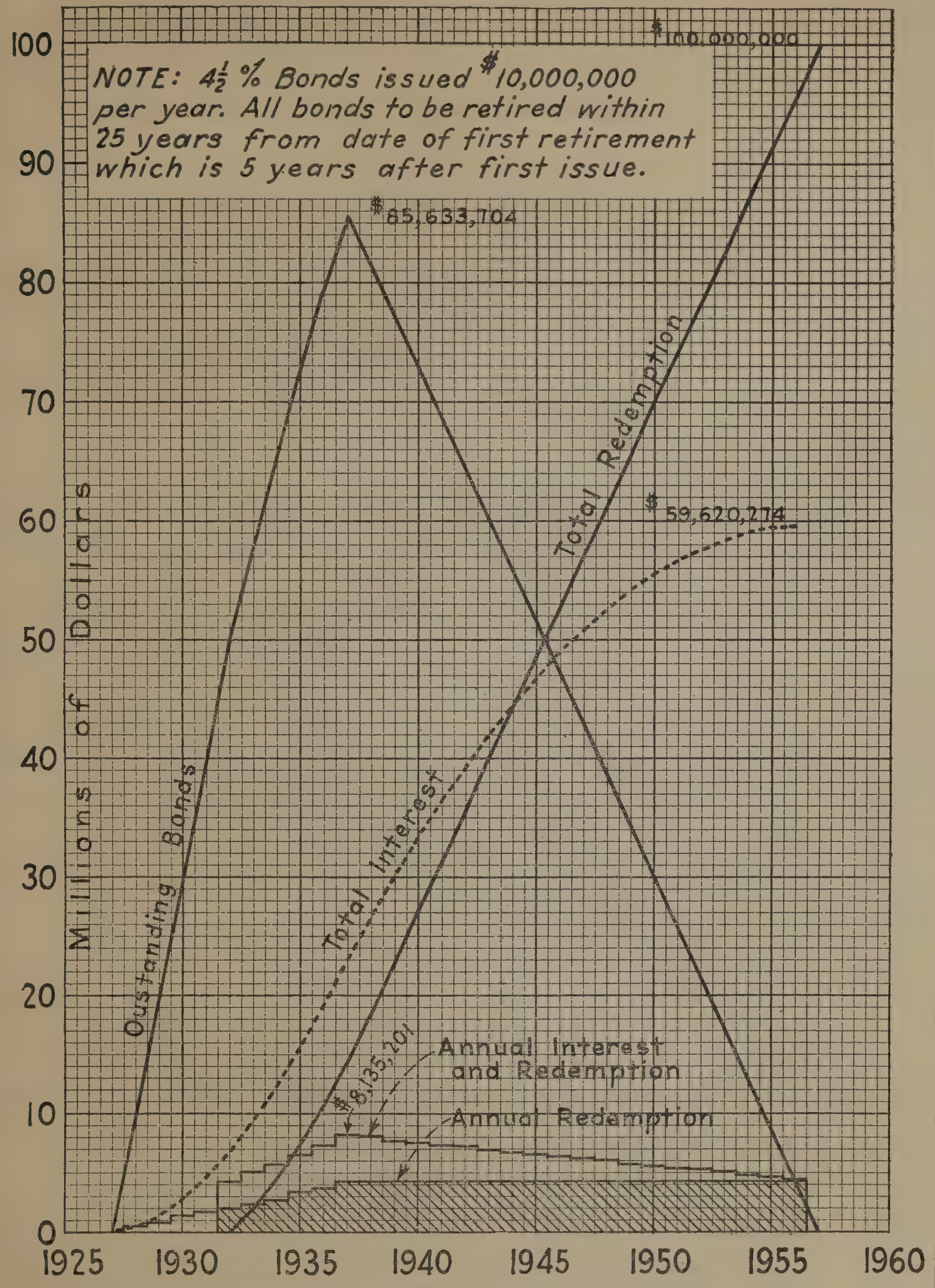
The expense of state governmental functions other than highway expense can normally be expected to continue to increase. Whether it will increase less rapidly than the revenue provided from the present taxes on corporations is a problem for the legislature itself to deal with.

Under the conditions legislative appropriations do not offer a means of procuring ready money for highway construction. We believe we are not warranted in recommending an increase in rates of revenue now assessed for general state purposes in order that money might be provided for direct legislative financing of state highway construction.

INCREASED TAX ON MOTOR VEHICLES.

The most practicable method by which funds can be raised on a pay-as-you-go basis is through an increased tax on motor vehicles. Such levy could be made either in the form of plate tax, weight tax, or gasoline tax.

As shown under the discussion of possible future bond issues, the interest and sinking fund payments on the bonds necessary adequately to complete the highways would, after a few years, equal or exceed the amount of annual expenditures made for construction from the proceeds of the bonds. If we can afford to raise money for interest and sinking funds for such large amounts, why not expend our income directly for the new construction desired? The state can well afford to establish a system of annual revenues to be expended for construction which will not be burdensome



NOTE: $4\frac{1}{2}$% Bonds issued $10,000,000 per year. All bonds to be retired within 25 years from date of first retirement which is 5 years after first issue.

STATE OF CALIFORNIA
HIGHWAY ADVISORY COMMITTEE

FINANCIAL DATA
OF A
TYPICAL $100,000,000 BOND ISSUE

RH.

upon any individual, and which will require no large interest payments. Such a system must, sooner or later, be established. It will yield a marked economy in financing and lead to better efficiency on the part of the whole construction organization.

The state has, by means of bonds, already obtained a good beginning on its highway system. These roads have so added to the general wealth as well as highway use that we find the work can now be carried along by means of a direct tax. It is desirable, as soon as possible, to move the finances for new construction to a "pay-as-you-go" basis. We believe the time has arrived when such a change should be inaugurated.

The financial plan recommended by the committee in the form of a $25,000,000 short term bond issue for urgently needed structures, to supplement a direct tax on the user for new construction, will serve to effect a gradual change from the past method to the future pay-as-you-go plan.

Future generations will have their own highway and traffic problems to solve, which will require all their ability for financing. Their problems, in a period of 15 years, will probably surpass our present one in size as much as our undertaking today exceeds that of 12 years ago. Therefore, before deciding to mortgage future generations for highways which we need at present, had we not better first decide whether we can afford to build them and pay as we go along?

Our study of the situation convinces us that it is fair to now ask the motor vehicle owners of California to bear, at least for a few years, the cost of carrying on new state highway construction. The extension of the use of the motor vehicle brought the need of a greatly improved and extended highway system and has thrown upon the state and local governments great additional financial burdens.

Since the state and counties have to so great an extent already endeavored to furnish the highway transportation facilities demanded, is it not fair that the motorists should assume an increased share of the burden of construction, provided a reasonable amount of taxation per car user will accomplish this result?

We find that motor vehicle owners, all over the state, are demanding a rapid extension of the system of improved roads in order that their operating costs may be decreased, and it is apparent under the conditions that they can make no valid objections to paying a *reasonable* motor vehicle tax, to be devoted to a proper program of highway construction and maintenance.

The benefits to the automobile user driving over improved highways, rather than unimproved, are so well understood as to need little discussion. It may be pointed out, however, that careful studies made by the American Association of State Highway Officials and others indicate not less than a 20 per cent reduction in vehicle operating costs on improved as against unimproved highways. Extending this to the individual automobile owner and assuming an average total operating cost of 12½ cents per mile, including all items of expense enumerated below, on unimproved highways, and an average annual travel of 5675 miles, the total saving in operation on improved roads as against unimproved roads would be $142 per car.

So far as commercial and industrial automobile use of the highways is concerned, the benefits of improved main highways accrue immediately to the owners in the form of lower transportation costs and will in general be passed on to consumers in the form of lower prices or will be absorbed as extra profits by the owners of productive property. To the extent that the general public shares in the benefits of cheaper transportation, special taxation of highway users will be passed on to them.

As shown in a following section under "Gasoline Tax," we find that for the first year's operation of the present gasoline tax 638,474,583 gallons of gasoline were used by vehicles on highways. Assuming that the average registered vehicle secures 12 miles to the gallon, it would appear that vehicles traveled an average of 5675 miles per year.

The total cost of owning, insuring, depreciating and operating all classes of motor vehicles, including trucks, probably is in excess of 10 cents per mile of travel on the average road of the state. Into this cost should properly enter such items as interest, depreciation, hazards of all kinds, whether insured by full coverage or not, maintenance, upkeep and operation.

Using the conservative figure of 10 cents per mile, it is found that the total cost for one year's operation for all motor vehicles in California probably exceeded $766,000,000, while the average cost per vehicle, including trucks, was about $560 per year.

We find under the present law that the gross registration and gasoline tax averages $14.17 per registered motor vehicle, including trucks. *This is only 2½ per cent of the foregoing estimated average annual operating cost per vehicle.*

The approximate average per privately owned automobile for registration and gasoline tax is estimated at $10.60 *per year.* This figure is arrived at from the flat $3 plate tax and the assumption that the average use of gasoline per privately owned automobile is probably about one-half the consumption of gasoline by commercial vehicles and trucks.

If our recommendation elsewhere made for an increased tax on motor vehicles in an amount sufficient to raise exactly $10,000,000 in 1926 should become effective, the average increase per registered vehicle, including trucks, in that year would be approximately $6.25, making a total of $20.42 per vehicle, including trucks, for all registration and gasoline taxes. *This rate would be only about 3½ per cent of the foregoing estimated average annual operating cost.*

Using the foregoing estimate of $10.60 for present average total tax per privately owned pleasure automobile, the additional $6.25 would increase the total for this class of vehicle to about $16.85.

If the owner of motor vehicles effects a saving approaching 20 per cent on improved roads as compared with unimproved roads, he will not object to paying a total tax for state and county road construction and maintenance, which would be only about 3½ per cent of his total expense.

The amount the motorist pays in gasoline and registration taxes is a subject frequently brought to his attention. He rarely estimates the total cost for his motor vehicle for the year. It comes home to him forcibly when he has an accident or pays for overhauling, or realizes the depreciation in his car when he turns it in for a new one.

The roadway which would be entirely adequate for local property is not a road suitable for motor vehicles, and tremendous outlays for wider grades, straight alignments and high-priced surfacing are made necessary to effect for him the comfort, safety and economy of operation which he demands.

We have considered the rapid increase in motor vehicles which is causing this increased expense and have given careful consideration to past and present distribution of the burden for all roads of the state, and after reviewing the various available methods for securing future construction revenue, *the committee recommends that the cost of remaining new construction should be financed from increased taxes upon the user of the highway in combination with the special bond issue elsewhere recommended.*

Considering the road work within the state being financed from other sources and the different taxation provisions for state and counties, we find that this method will place the total burden of road taxation more equitably than any other plan. This source of revenue would be the surest, and the amount paid by the individual the most consistent with his use of and his demand for state highways.

To carry out this plan of obtaining the funds we have recommended for 1926, would require an average increase payment per motor vehicle of $6.25.

After comparing this rate of taxation with that set forth in a following section on "Motor Vehicle Taxation in Other States," and considering the benefits secured by the motorist, we are convinced that this proposed increase will not be a burden upon the users of the highway.

A selection between the various possible means of placing this increase upon motor vehicles is a detail of the main problem. This will be considered in the following sections.

MOTOR VEHICLE PLATE TAX.

Under the existing law a uniform registration fee or plate tax of $3 is paid for each automobile, truck, motorcycle and trailer, except electric vehicles, which pay a higher rate, as shown in Appendix J, in lieu of gasoline tax.

The plate tax, after deducting cost of operation of the Motor Vehicle Department, is distributed one-half to the counties and one-half to the Highway Commission. The amount of this tax is reported in connection with the extra tax assessed upon commercial vehicles and trucks. For the registration year 1924, the amount of these two taxes combined, to be received by the State Highway Commission, will be $3,079,658.85 after deducting cost of operating the Motor Vehicle Department.

Our plate tax of $3 per vehicle is the lowest of any state, as shown in Appendix J. *It would, therefore, be reasonable to make a moderate increase in the flat plate tax for motor vehicles.* As to what such an increase should be, we make no definite recommendations. The amount would depend upon the amount of other increases in motor vehicle taxation.

Under the section showing estimated possible future revenues from motor vehicles on page 65 will be found a forecast of the future income from the present registration and truck weight taxes combined and also an estimate of the amounts which would be realized annually to 1935 from an increased flat plate tax in amount of $2 per vehicle.

If an increase in registration fees exceeding this amount should become necessary it should be levied in the form of a weight tax rather than a plate tax for reasons given in the following section.

MOTOR VEHICLE WEIGHT TAX.

The only weight tax now in effect is the surcharge placed upon commercial motor vehicles and trucks. The rates for this tax, which are not on a uniform pound basis, are shown in detail in Appendix J. The rate for solid-tired vehicles is double that for pneumatic-tired vehicles. The income now received from this source is accounted for in connection with plate tax rates and is set forth in the foregoing section. Estimates of future revenue are shown in tabulation, on page 65.

To collect more than a nominal registration tax per vehicle, the tax should properly be levied on a weight basis, at a stated rate per hundred pounds.

The weight may be required either to include load of vehicle or only the unladen vehicle, dependent upon rate and whether arrangement for variable tax, increasing for larger vehicles, is used.

Under a weight tax the rate per hundred should be increased for commercial vehicles above that for automobiles and again increased for solid-tired vehicles, which include most of the large trucks. The heavy solid-tired trucks do the most damage to the road surface, and should be assessed accordingly.

Weight tax is more fair than other forms of registration tax for the reason that the tax increases directly with the potential destructive power of the vehicle and the load it is able to carry.

In the event our recommended $10,000,000 annual increase in motor vehicle taxation for the year 1926 should not be placed for the largest part upon gasoline, then the most equitable way of raising such an amount from registration would be by means of a weight tax. We consider this method less equitable than the gas tax method, however.

A weight tax or any form of registration tax must be paid in a lump sum in advance of the beginning of the year. The average man prefers to pay on easy installments, and so prefers the gas tax.

A weight tax must be paid in an arbitrary amount, whether the vehicle is used constantly or only on rare occasions, while a gas tax is exactly proportioned to service received from the roads.

A weight tax is a reasonable distribution of the burden on the potential user of the road, if the purpose were only to reach those who might some day travel the road, but not a fair distribution upon the actual user who receives the service afforded by the road.

To show the possibilities of this form of taxation, we have set forth in the tabulation on page 65 in a following section, a column showing the amounts which might be derived annually to 1935 from an additional weight tax.

For illustration we have assumed a tax of 20 cents per 100 pounds on private passenger automobiles, 30 cents on commercial pneumatic tired vehicles and 40 cents on solid tired trucks, less 75 cents per vehicle for cost of collection. All weights for vehicles unladen.

The average weight for each of these three classes of vehicles was determined by the Division of Motor Vehicles, by research of several thousand registrations.

GASOLINE TAX.

Below is shown an arrangement of data derived from one year's operation under the present 2-cent gasoline tax. In it will be found for the first four quarters of operation the quarterly levy made by the State Board of Equalization, the quarterly collections by the State Controller and the quarterly refunds claimed for gasoline used for purposes other than operating vehicles on the highway.

It is noted that for the year the collections averaged 94.37 per cent of the levies. The refunds over quarterly periods following date of purchase averaged 8 per cent of the levy, or 8½ per cent of the collection for an equivalent length of time. In making a study of these incomes, it should be understood that purchasers of gasoline are granted a period of six months after date of purchase in which to submit claim for refund. It is noted that the refunds increased from 5.1 per cent of the levy in the first quarter to 8.2 per cent of the levy in the fourth quarter.

The amount actually apportioned by the State Controller, half to the state and half to the counties, from the first year of operation was $12,126,145.51, while the data analysis shows the balance available for such apportionment for the first year would apparently have been only $11,988,220.97, except for the

DATA FROM ONE YEAR PERIOD, TWO-CENT GASOLINE TAX—CALIFORNIA.

Month	Year	Levy	Collection	Per cent collection of levy	Refunds		Paid in—		Per cent refund		Balance for apportionment
					Quarter total	Amount	Month	Year	Levy	Collection	
Oct. Nov. Dec.	1923	$3,018,366 59	$2,929,366 30	97.05	$214,393 18	$53,171 9 91,159 07 70,062 52	Feb. Mar. Apr.	1924	5.1	7.3	$2,714,973 12
Jan. Feb. Mar.	1924	3,111,200 66	2,985,983 83	95.98	245,680 98	93,412 69 66,643 15 85,625 14	May June July	1924	7.9	8.2	2,740,302 85
Apr. May June	1924	3,788,281 79	3,455,925 88	91.23	324,508 44	60,339 13 146,951 81 117,217 50	Aug. Sept. Oct.	1924	8.6	9.4	3,131,417 44
July Aug. Sept.	1924	3,969,975 56	3,725,277 89	93.84	323,750 33	95,159 01 109,766 58 118,824 74	Nov. Dec. Jan.	1924 1925	8.2	8.7	3,401,527 56
Totals		$13,877,824 60	$13,096,553 90	94.37	$1,108,332 93	$1,108,332 93			8.0	8.5	*$11,988,220 97

*Total balance available for apportionment does not check with actual apportionment by Controller for yearly period ending September 30, 1924, because refunds for a one-year period have been arbitrarily assigned to quarter periods and because total refunds were not available at the time apportionment was made. Taxation began October, 1923, and first refunds in February, 1924. Refunds may be claimed within six months from date of purchase. Refunds consist of taxes collected on gasoline used for purposes other than for vehicles using highways.

Actual tax on gas used on highways therefore is the amount of one year levy less one year refund or $12,769,491 67

Total gasoline consumption by vehicles on highways one-year period, October 1, 1923, to September 30, 1924 638,474,583 gallons.

The levy for the quarter, October, November and December, 1924, was $3,533,592.39, but collections have not yet been made.

AVERAGE COST PER CAR PER YEAR FOR TWO-CENT GAS TAX.

	Registration, 1924	Levy less refund	Actual apportionment	Balance for apportionment
		$12,769,491 67	$12,126,145 51	$11,988,220 97
(Average) July 31, 1924	†1,234,579	10.34	9.82	9.71
(Total) January 31, 1925	1,350,000	9.46	8.98	8.88

† Middle of registration year taken as the average for the year.

fact that total refunds were not available at the time apportionment was made.

The analysis shows that, using the actual apportionment basis, the average gasoline tax paid for the year per registered motor vehicle, based upon end of the year registration figures, was $8.98. If we take the actual apportionment divided by the mid-year registration, we get $9.82.

In the estimates of possible future revenue from gasoline taxation set forth in tabulation page 65 in a following section, we have used a figure of $5 per vehicle for each 1 cent of tax, applied to the average or mid-year registration, which is substantially the same as derived from the first year's operation. We find that a 1-cent additional tax on gasoline, all to go to the state, would yield $7,800,000 in 1926, increasing thereafter in proportion to registration. This would provide 78 per cent of the amount of new financing we have recommended for annual state highway construction for 1926.

Having recommended that future state highway construction be borne by the motor vehicle user, we believe that the particular kind of tax selected for him to pay should be the one most agreeable to him, so long as it is equitable, easy to collect, and produces the necessary funds. To require the motor vehicle user to pay this amount of taxes in a form less agreeable to him would be unfair.

Our travels throughout the state during the past year and the canvass of motorists made by individuals, in addition to our many random inquiries and the resolutions of numerous organizations, have convinced us that a gasoline tax is decidedly more popular than any other form of motor vehicle taxation.

We find that the gasoline tax is as popular as any tax could be.

The popularity of the gasoline tax for road building and maintenance is indicated by the rapid spread of this form of taxation throughout the United States. Gasoline taxes in the various states in 1924, and the average amount realized therefrom per vehicle are shown in plate on page 67, which indicates that 35 states then collected gasoline tax. Two more have enacted 2-cent gasoline tax laws effective in 1925, making the total to date thirty-seven states, while similar measures are pending in ten of the remaining states, with prospects that several of them will enact gasoline tax laws during the year, while others will increase present rates per gallon.

The popularity of gasoline tax for roads was shown in Missouri, where the people at the last election, by a two-to-one vote, declared for a 2-cent tax.

The factors of most importance in estimating the costs accruing to the state from motor vehicle traffic are the mileage traveled, the gross weight of the vehicle, and the speed at which it is driven. The amount of fuel consumed reflects in large measure all of these factors.

The gasoline tax is conveniently paid, easily collected and easily administered.

The gasoline tax is the only practicable method of reaching highway users from other states.

The gasoline tax appeals to the average motorist as the only fair method of metering his actual use of the road. If his car stands idle or is laid up for repairs, he pays no tax, while if he travels a large mileage he has appreciated the value of the highway and recognizes the justice of paying a larger tax.

The average motorist would prefer the payment of his motor vehicle tax on the installment plan, instead of in a lump sum at the beginning of the year, as indicated by the fact that from 75 to 80 per cent of all automobiles are sold on the installment plan.

The gasoline tax is an advantage to motor vehicle dealers as compared with a heavy registration or weight tax, because of the fact that a large registration fee would be a sales resistance with many installment purchasers, while the gasoline tax would have little effect.

The expense of collecting gasoline tax is practically nothing, no deductions having been made for that purpose during the past year. It is probable that a very small deduction may become necessary to handle the clerical expense entailed by the growing volume of refund claims.

The fact that a gasoline tax is an accurate measure of the use of the highways makes it also a measure of the need of the individual taxpayer for additional highway facilities.

ESTIMATED FUTURE MOTOR VEHICLE REGISTRATION.

An estimate of future motor vehicle registration is necessary before we can proceed to consider possible future revenues from this source by present or proposed methods of taxation.

The principal factors entering into an estimate of future registration are population, ratio of registration to population, and the relative rates of increase of both.

We can only estimate from the experience of the past modified by the best collective judgment of the various statisticians who have been making a study of these questions.

The curves in the plate on the following page show the actual and estimated population and registration from 1910 to 1935. We consider it inadvisable to attempt to forecast any further into the future.

For the population curve we have taken the actual census to 1920 extended by the population estimates made by the United States Bureau of Census for the years 1921–22–23. Beyond this point the curve has been extended to 1935 on the basis of the past direction of the curve and the best information we could assemble. This brings us to an estimated population for California of 6,000,000 in 1935. We feel that this is a reasonable and conservative estimate. Since making it we find it has checked reasonably close to the estimates of a number of other investigators, who have arrived at their results by different methods.

The registrations platted on the curve are the actual registration for the years 1910 to 1923, including automobiles and trucks only, motorcycles and trailers having been eliminated. The elimination of these two classes has been approximately compensated so far as registration tax possibilities are concerned by the exempt motor vehicles which have been included in the platting.

This arrangement in platting the curve was used for the reason that in estimating gasoline taxes, exempt vehicles are users of gasoline while the use of gasoline by motorcycles and trailers is practically negligible.

The registration shown for 1924 was estimated before the close of the registration year. We now find that, after modifying the actual returns from the registration year in the same manner as used for previous years, the figure we have used on the curve is 11,000 vehicles in excess of the actual figure.

The curve showing estimated registration to 1935 has been projected on the assumption of a maximum ratio of one motor vehicle to each 2.5 persons, after deducting motorcycles and trailers. This ratio is shown as being reached in 1930 and the curve between 1924 and that date is platted to provide for a gradually decreasing rate of increase consistent with this maximum ratio.

Appendix "D" contains a tabulation showing the ratio of motor vehicles to population by counties for the year 1923 which is the last for which United States Census estimates are available. The figures for 1923 include motorcycles and trailers, but do not include exempt motor vehicles. On this basis they show an average of 3.4 persons per vehicle in 1923. If exempts were added, as is usually done, this figure would be slightly smaller.

The 1923 figures show the heaviest ownership in Orange County with 2.14 persons per motor vehicle, while Los Angeles County follows with 2.52 persons per motor vehicle. The number of vehicles has increased in all counties in 1924, but the census figures of population are not available.

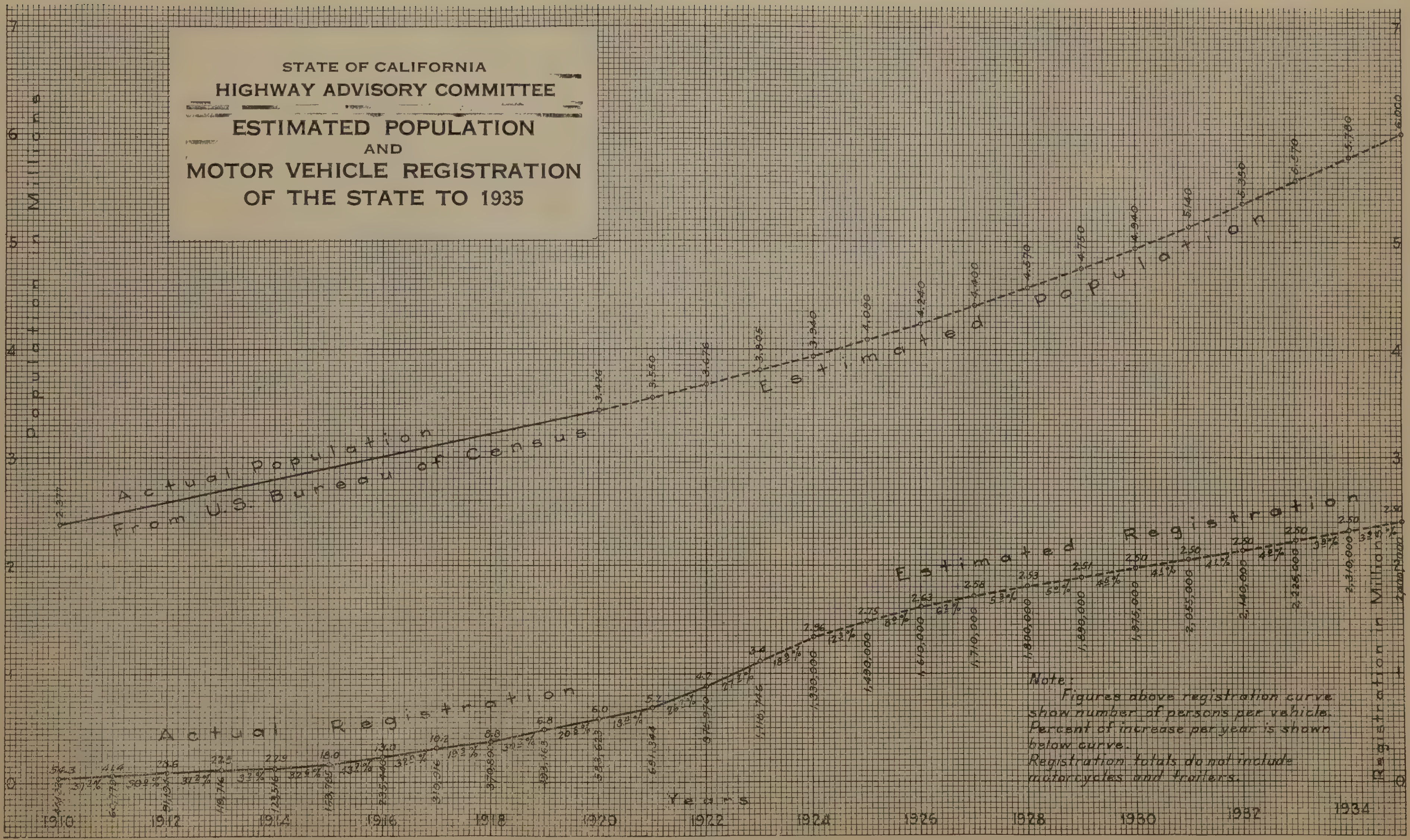
The total actual registration of the state for 1924, after deducting motorcycles and trailers, and using our estimate of population, averages 2.99 persons per vehicle.

We consider it unjustified to assume that the ratio of population to motor vehicles would be less than 2.5 in 1930.

PRESENT AND ESTIMATED POSSIBLE FUTURE REVENUE FROM MOTOR VEHICLES.

The foregoing estimate of future motor vehicle registration serves as the basis of our estimate for future revenue expected from existing and possible additional motor vehicle taxation.

In the tabulation on the following page will be found an estimate showing the revenue which will become available to the state from one-half of the net returns from the present registration fees and from the present 2-cent gasoline tax, for the years 1924 to 1935, inclusive. Also the total of these prospective revenues for the ten-year period from 1926 to 1935, inclusive.



STATE OF CALIFORNIA
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ESTIMATED POPULATION
AND
MOTOR VEHICLE REGISTRATION
OF THE STATE TO 1935

Note:
Figures above registration curve show number of persons per vehicle.
Percent of increase per year is shown below curve.
Registration totals do not include motorcycles and trailers.

ESTIMATED YEARLY REVENUE PRODUCED BY PRESENT AND POSSIBLE ADDITIONAL MOTOR TAXES.

Year	Estimated Population	Estimated registration	Per cent increase	Persons per car	Registration factor	Estimated average registration	State's share present motor taxes			Possible additional motor taxes		
							One-half present registration fee net	One-half present gas tax	Total	Net weight tax (1)	One cent additional gas tax (2)	$2.00 additional registration fee (3)
1924	3,940,000	1,330,000	18.9	2.96	0.826	1,212,600	$3,100,000	*$6,063,000	$9,163,000			
1925	4,090,000	1,490,000	12.3	2.75	0.920	1,420,000	3,453,000	7,100,000	10,553,000			
1926	4,240,000	1,610,000	8.0	2.63	1.000	1,560,000	$3,753,000	$7,800,000	$11,553,000	$7,926,500	$7,800,000	$3,220,000
1927	4,400,000	1,710,000	6.2	2.58	1.060	1,670,000	3,978,000	8,350,000	12,328,000	8,402,000	8,350,000	3,420,000
1928	4,570,000	1,800,000	5.3	2.53	1.120	1,770,000	4,203,500	8,850,000	13,053,500	8,877,500	8,850,000	3,600,000
1929	4,750,000	1,890,000	5.0	2.51	1.180	1,850,000	4,428,500	9,250,000	13,678,500	9,353,250	9,250,000	3,780,000
1930	4,940,000	1,975,000	4.5	2.50	1.230	1,940,000	4,616,000	9,700,000	14,316,000	9,749,500	9,700,000	3,950,000
1931	5,140,000	2,055,000	4.1	2.50	1.280	2,015,000	4,804,000	10,075,000	14,879,000	10,146,000	10,075,000	4,110,000
1932	5,350,000	2,140,000	4.1	2.50	1.330	2,100,000	4,991,500	10,500,000	15,491,500	10,542,250	10,500,000	4,280,000
1933	5,580,000	2,225,000	4.0	2.50	1.380	2,180,000	5,179,000	10,900,000	16,079,000	10,938,500	10,900,000	4,450,000
1934	5,800,000	2,310,000	3.9	2.50	1.440	2,270,000	5,385,500	11,350,000	16,735,500	11,374,500	11,350,000	4,620,000
1935	6,000,000	2,400,000	3.9	2.50	1.490	2,350,000	5,592,000	11,750,000	17,342,000	11,810,500	11,750,000	4,800,000
Grand total, 1926 to 1935 inclusive—10 years only							$46,931,000	$98,525,000	$145,456,000	$99,120,500	$98,525,000	$40,230,000

(1) Net weight tax is calculated on the following basis:
Passenger Autos at average weight of 2400 pounds per vehicle at 0.2 cent per pound, less 75 cents per vehicle for cost of collection.
Truck Pneumatic at average weight of 2600 pounds per vehicle at 0.3 cent per pound, less 75 cents per vehicle for cost of collection.
Truck Solid at average weight of 5500 pounds per vehicle at 0.4 cent per pound, less 75 cents per vehicle for cost of collection.
(2) Revenue produced by One Cent Gas Tax estimated at $5 per vehicle for average registration.
(3) Revenue produced by a flat additional registration fee of $2 per vehicle.
*Actual receipts for one year period October 1, 1923, to September 30, 1924.

The last three columns of the tabulation show an estimate of possible additional motor taxes discussed above for years 1926 to 1935, inclusive.

One of these additional taxes is estimated for a weight tax of 20, 30 and 40 cents per hundred pounds for each of the three classes of vehicles as described on page 60 in the section on weight tax.

Another column shows the revenue estimated for a 1-cent additional gas tax, all to go to the state.

It is noted that the proposed weight tax and the 1-cent additional gasoline tax produce almost identically the same amounts.

The last column of the tabulation estimates the returns which may be expected from a $2 additional registration fee.

From the data contained in the tabulation, other combinations suggest themselves.

The chart on this page shows graphically the same estimates as are presented in the tabulation.

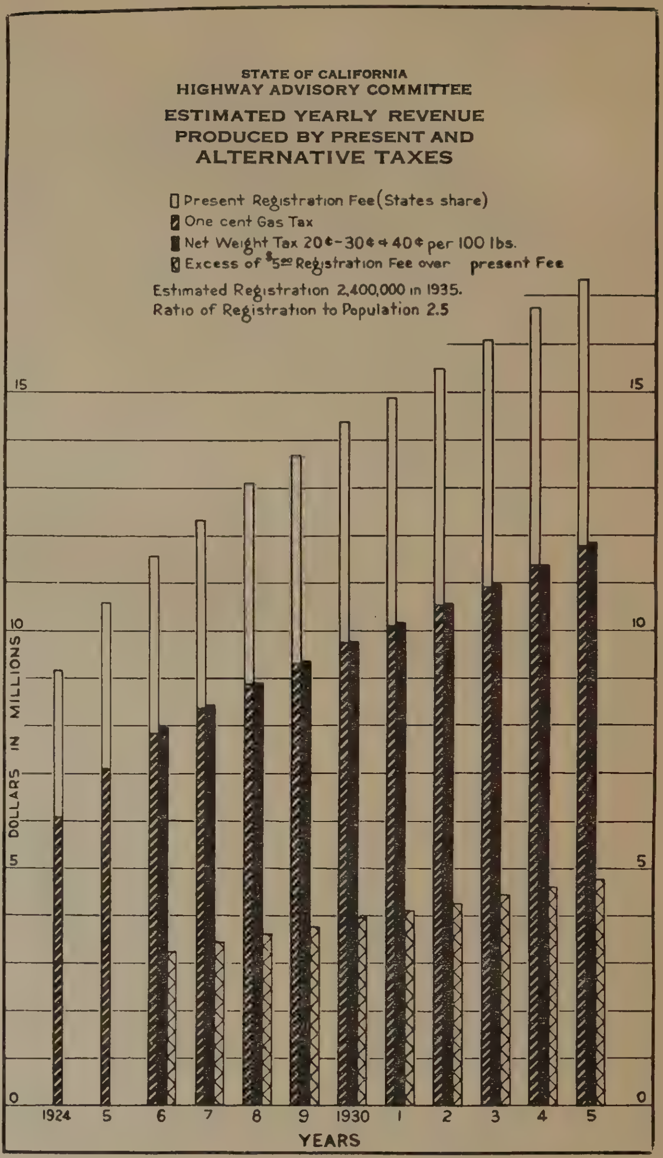
These estimates show that a 1-cent additional gasoline tax would produce $7,800,000 for the year 1926, increasing up to $11,750,000 in 1935.

A $2 flat registration fee would produce $3,220,000 in 1926, increasing up to $4,800,000 in 1935.

A combination of a 1-cent gasoline tax and a $2 plate tax would yield $11,020,000 in 1926.

An amount of $10,000,000 would be produced in 1926 by a 1-cent additional gasoline tax and an increase of slightl yless than $1.50 in the plate tax, all becoming available to the state.

By referring to pages 23 and 24 of this report, under the subject "Funds for Maintenance and Reconstruction," will be found the estimated requirements of the next five years for maintenance and reconstruction, which show that all of the funds to become available from existing registration and gasoline taxes will be less than estimated necessary for maintenance and reconstruction during such period, with the prospect that the demand for such funds for similar work will continue to grow after 1930, at least as rapidly as registration increases. This points to the definite necessity for new financing for all new construction expected to be undertaken in the future, except such as can be paid for by federal aid.



NOTE.—Revenue indicated as "Excess of $5 registration fee over present fee" represents the proposed $2 additional registration fee shown in last column of tabulation, "Estimated yearly revenue produced by present and possible additional motor taxes."

MOTOR VEHICLE TAXATION IN OTHER STATES.

The tabulation and chart on the opposite page shows automobile registration for 1924 and the average taxes paid in those states per registered vehicle for registration fees of various kinds and for gasoline tax.

To the list of states with gasoline taxation should be added Michigan and Missouri with 2-cent tax measures effective in 1925, making a total of thirty-seven states now assessing gasoline.

The rate varies from 1 cent to 4 cents per gallon. The situation is summarized as follows:

Gasoline Tax for 1925.

No. of states	Cents per gallon
11	0
7	1
18	2
2	2½
8	3
1	3½
1	4

37 states average 2.15 cents per gallon.

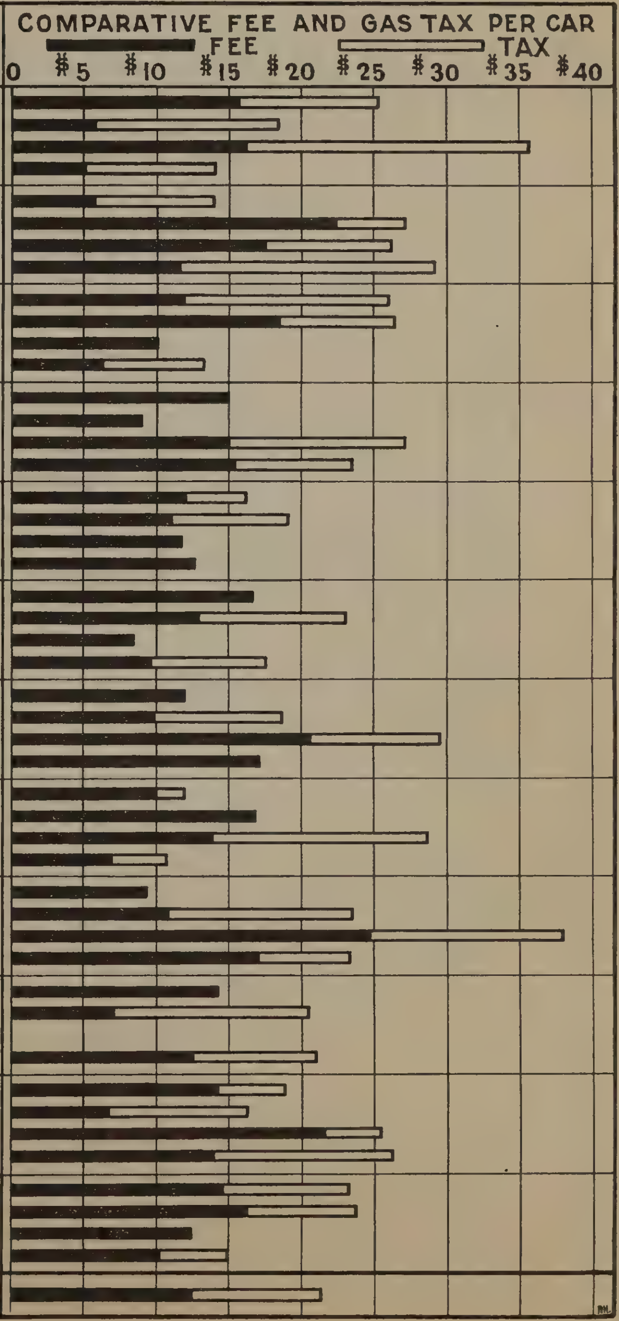
In ten of the eleven remaining states without gasoline tax, measures are pending or being promoted to provide for a tax of 2 cents or more in each case.

The average total registration fee shows California, with $5.19 per vehicle, including trucks, to be the lowest of any of the states reported, the average being $12.50.

A study of motor vehicle taxation in other states and consideration of the benefits realized by motor vehicle owners from modern highway construction and maintenance is convincing evidence that the existing motor vehicle taxation in California can be increased by the average of $6.25 per registered vehicle to produce the recommended fund for new construction without unreasonable burden.

~ AUTOMOBILE REGISTRATION ~ 1924 ~ AVERAGE FEES AND GAS TAX ~

STATES	Nº CARS REGISTERED	AVERAGE REG'N. FEE	GAL. GAS TAX	GAS TAX PER CAR
ALABAMA	158,019	15.73	2	9.56
ARIZONA	57,828	5.87	3	12.64
ARKANSAS	143,000	16.30	4	19.43
CALIFORNIA	**1,350,759**	**5.19**	**2**	**8.98**
COLORADO	213,247	5.85	2	8.16
CONNECTICUT	222,222	22.30	1	4.85
DELAWARE	34,600	17.46	2	8.73
FLORIDA	210,000	11.66	3	17.42
GEORGIA	209,000	12.00	3.5	14.00
IDAHO	70,660	18.50	2	8.00
ILLINOIS	1,132,641	10.16	0	0
INDIANA	651,705	6.30	2	7.56
IOWA	619,000	15.00	0	0
KANSAS	377,544	9.03	0	0
KENTUCKY	231,784	15.10	3	12.00
LOUISIANA	178,000	15.45	2	8.12
MAINE	127,178	12.10	1	4.11
MARYLAND	209,000	11.11	2	8.00
MASSACHUSETTS	685,774	11.84	0	0
MICHIGAN	883,000	12.76	0	0
MINNESOTA	525,000	16.72	0	0
MISSISSIPPI	134,657	13.00	1-3	10.30
MISSOURI	547,000	8.40	0	0
MONTANA	79,965	9.71	2	7.91
NEBRASKA	300,000	12.00	0	0
NEVADA	18,327	9.88	2	6.34
NEW HAMPSHIRE	73,633	20.67	2	8.94
NEW JERSEY	517,000	17.15	0	0
NEW MEXICO	41,750	10.10	1	3.20
NEW YORK	1,420,000	16.90	0	0
NORTH CAROLINA	305,756	13.92	3	14.82
NORTH DAKOTA	117,050	6.98	1	3.78
OHIO	1,244,000	9.39	0	0
OKLAHOMA	337,740	10.93	2.5	12.58
OREGON	192,615	24.73	3	13.28
PENSYLVANIA	1,200,000	17.00	2	6.30
RHODE ISLAND	114,000	14.20	0	0
SOUTH CAROLINA	162,749	7.11	3	13.43
SOUTH DAKOTA	142,396	No Report	2	No Report
TENNESSEE	205,821	12.62	2	8.39
TEXAS	830,000	14.21	1	4.70
UTAH	72,000	6.75	2.5	9.55
VERMONT	61,179	21.60	1	3.77
VIRGINIA	270,000	14.04	3	12.27
WASHINGTON	306,000	14.62	2	8.61
WEST VIRGINIA	199,805	16.31	2	7.50
WISCONSIN	500,000	12.50	0	0
WYOMING	43,609	10.28	1	4.66
TOTAL AND AVERAGE	17,727,013	12.50	2.13	8.88



Such an increase yielding $10,000,000 in 1926, would, in California, bring the total average per registered vehicle, including trucks, to $20.42, while the 1924 average for all states is shown to be $12.50 for registration and $8.88 for gasoline, making a total of $21.38.

As shown elsewhere, the proposed increase in California would bring the total of registration and gasoline tax for privately owned pleasure automobiles to about $16.85, on the assumption that trucks and commercial cars use twice as much gasoline per vehicle as private pleasure cars.

COUNTY PORTION OF MOTOR VEHICLE REVENUE.

The counties receive for road maintenance or construction one-half of the present net revenue derived from registration and gasoline taxes.

We see no reason why this proportion of the *present rates* of motor vehicle taxation should not continue to go to the counties to be used for road purposes.

In view of the emergency existing for refinancing the state highway construction work, and in view of the fairness of distributing the combined state and county road burden between the user, the general public and property, as hereinbefore discussed, and in view of the fact that the counties can levy upon property while it is impracticable for the state to do so,

We recommend that any increase in the taxes upon motor vehicles, which may hereafter become effective, should be made available entirely to the state for new construction work.

FINANCING RECOMMENDATIONS.

Having considered all of the existing conditions, we make the following recommendations for financing:

We recommend that the financing of state highway construction be changed from the expensive long-term-bond method to the "pay-as-you-go" method.

We recommend the immediate refinancing of state highway construction by one or more methods which will insure a revenue of approximately $10,000,000 for the year 1926, with annual amounts increasing each year thereafter at the same rate as the increase in motor vehicle registration, such revenue to be in addition to such construction revenue as may be made available from federal aid or supplementary bond issues.

We recommend that the revenue for this construction program be derived from increased taxes upon motor vehicles, either by increasing the plate tax, by a graduated weight tax, or by an increased tax on gasoline, or some combination of these forms of tax.

We recommend the selection of that form of taxation on motor vehicles which will be the most equitable and the most acceptable to those who pay the tax.

We recommend that increases in motor vehicle revenue be made available entirely to the state for highway construction.

We recommend that steps be taken by the legislature, preliminary to placing before the voters at the next general election, a bond issue of $25,000,000 in short-term bonds, all proceeds of which shall be used on the primary road system for the construction of major bridges and to defray the state's portion of the cost of the elimination of railroad grade crossings, in cooperation with railroads, the division of expense to be fixed by the California Railroad Commission for each grade crossing elimination project.

APPORTIONMENT OF FUNDS.

Our study of the general location of the roads comprising the state highway system and the funds expended theron in conjunction with the source of past and future revenues for construction of the system, has brought us to the conclusion that there is inequality in expenditure of funds and in distribution of the road mileage throughout the state.

There exists in the southern counties a well defined conviction that state highway expenditures have not resulted in the improvement of state highways in that territory at a rate commensurate with the need or with the amount of road building money derived from that section. A study of this situation, caused by unequal rates of development during the past twelve years, indicates that the southern part of the state is entitled to a more equitable arrangement.

For the purpose of discussing this question, the thirteen counties of San Luis Obispo, Tulare, Kern, Mono, Inyo, San Bernardino, Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Diego and Imperial are considered the southern area or district.

The remaining forty-five counties of the state are considered the northern area or district.

PRESENT CONDITIONS NORTH AND SOUTH.

There has been no legislation or definite policy set up to govern the Highway Commission in allocating expenditures from bond and federal aid funds to the various parts or districts of the state. Apparently the Commission has attempted, during the past thirteen years, to so distribute construction work to the various parts of the state as to meet what at the time seemed to be the most urgent demand, so far as consistent with a general policy of expediting improvement of the main lines of traffic.

The general location of the state highways has been fixed by the three bond issues or legislative enactments, with the result that a greater mileage of state highways has been created in the north than in the south.

The first bond act required connections to each county seat. In the north there are 45 county seats to be served, 20 of them lying at a distance from the Class A Primary roads, while in the south there are 13, only 3 of which do not fall geographically upon Class A Primary roads. This is one of the largest factors in placing more state road mileage in the north than in the south. The county seat laterals we consider a statewide obligation.

The proportion of roads in the north was still further increased by legislative enactments. There existed conditions of topography and distribution of population, which at the time perhaps seemed to justify these roads, but the result has been, as found by our classification analyses, that a much larger proportion of the state highways of lesser importance are found in the north than in the south.

The northern district contains 52 per cent of the area and 55 per cent of the population of the state according to the 1923 United States Census estimates, while the southern district has 48 per cent of the area and 45 per cent of the population.

Reference to the accompanying map showing distribution of population in relation to the state highway system helps to account for the distribution of state highway mileage. It is apparent that the population of the southern counties is concentrated in a few densely populated areas. The principal one, including the southerly portion of Los Angeles County and extending southeasterly to San Bernardino, Riverside and Santa Ana, is rapidly becoming a continuous metropolitan district. Outside of this area and the smaller centers of population at San Diego, El Centro, Bakersfield and Santa Barbara, it is noted that very little population is found over the remaining area of the district.

This probably accounts for the lack of a uniform distribution of road mileage over the entire southern area, such as is found more generally over the northern counties. This condition is definitely shown in the United States Bureau of Public Roads Census of 1922 which finds 60.2 per cent of all the public road mileage of the state, outside of cities, in the northerly counties and only 39.8 per cent in the southerly counties. These figures represent the road mileage needs of the two districts as interpreted and laid out by the counties themselves.

The mileage of the existing state highway system is located 63 per cent in the north and 37 per cent in the south. Of all public roads in the state reported in 1922 we find that 9.7 per cent in the north and 8.7 per cent in the south are now in the state highway system while for the whole state the rate is 9.3 per cent.

EXPENDITURES FOR CONSTRUCTION, NORTH AND SOUTH.

We find that expenditures from state and federal aid funds for construction to June 30, 1924, have been 66 per cent in the north and 34 per cent in the south, and that with this expenditure the combined mileage of state highways improved either with pavement or with grading and gravel surfacing totaled 2308 miles in the north and 1135 miles in the south. The mileage of improvement in the south contains a larger proportion of pavement than the mileage in the north. The average expenditure per mile improved by grading or paving was $20,805 in the north as compared with $22,114 in the south.

The rates of expenditure per mile for fully completed paved road will average higher in the north than in the south because of heavier average grading.

The estimates of the total cost to complete the present state highway system show the remaining work to be located as follows:

Location of Completion Estimates.

	45 Northern counties Amount	%	13 Southern counties Amount	%
Primary roads----	$98,959,594	63	$57,387,411	37
Secondary roads---	45,606,350	75	15,309,067	25
Totals-----------	$144,565,944	67	$72,696,478	33

EXPENDITURE FOR MAINTENANCE AND RECONSTRUCTION, NORTH AND SOUTH.

The records show that the direct expenditures on the state highways to June 30, 1924, from motor vehicle funds and gasoline tax funds for maintenance and reconstruction since the creation of these funds has been $13,451,444, or 66.3 per cent, in the north, and $6,838,930, or 33.7 per cent in the south. This covers a period of about ten years and shows the same ratio north and south as for construction. This does not include an undistributed expenditure from these funds of $1,867,984 for buildings, plants, equipment, stores and administration expense.

For the year 1925 there will be under state maintenance 3085 miles of state highways, or 62.7 per cent in the north, and 1833 miles, or 37.3 per cent in the south.

The relative expense north and south for maintenance and reconstruction should be governed by relative traffic and its effect on the road. These factors indicate that for the next few years the expenditures for both should increase faster per mile in the south than in the north.

INCREASE IN WEALTH.

In Appendix F will be found a tabulation of the total assessed valuation of all property from 1912 to 1924, showing the resources of these districts and their relative change from the beginning of actual state highway building to date. When the people of the state entered into agreement, one with the other, in 1909, to establish and begin to construct the fundamental state highway system of the first bond issue, the north district contained 62.5 per cent and the south 37.5 per cent of the state's total assessed valuation.

Both sections increased steadily but the south made more rapid progress, having 50.8 per cent in 1923 and jumping to 55.3 per cent in 1924. Now, with its success and leadership in wealth, it shoulders more of the responsibilities for state progress which are carried by the leading centers of population in every state.

DISTRICT ORIGIN OF BOND REVENUES.

The principal and interest on state highway bonds is paid from general state taxes derived from corporations which pass the bill on to the public. The proportion in which state taxes are derived from the north and south districts can be only approximated.

We find that 69 per cent of the total state taxation for the current fiscal year will be

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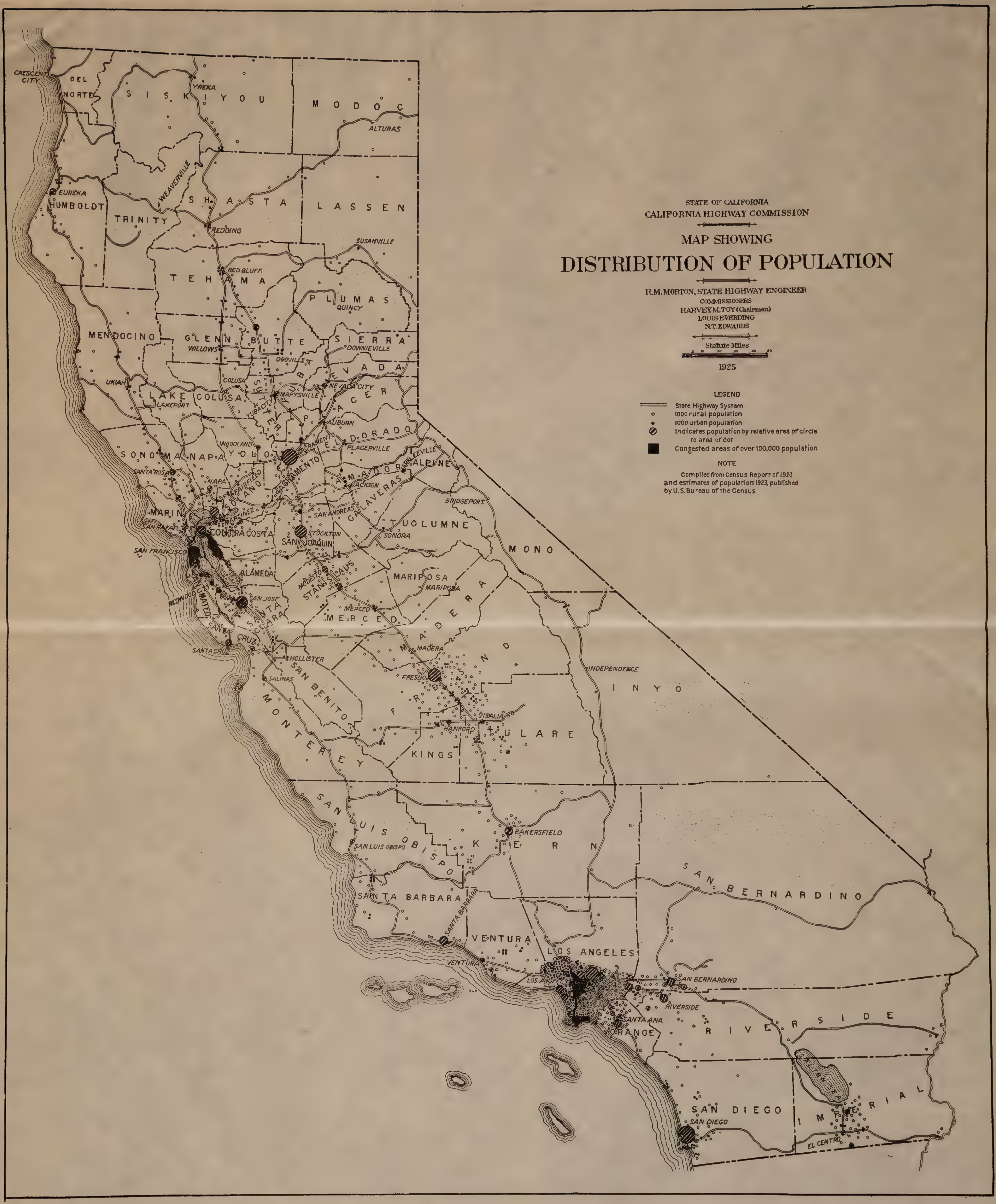

STATE OF CALIFORNIA
CALIFORNIA HIGHWAY COMMISSION

MAP SHOWING

DISTRIBUTION OF POPULATION

R.M. MORTON, STATE HIGHWAY ENGINEER
COMMISSIONERS
HARVEY M. TOY (Chairman)
LOUIS EVERDING
N.T. EDWARDS

Statute Miles
5 10 20 30 40 50

1925

LEGEND

═	State Highway System
○	1000 rural population
•	1000 urban population
⊘	Indicates population by relative area of circle to area of dot
■	Congested areas of over 100,000 population

NOTE

Compiled from Census Report of 1920 and estimates of population 1923, published by U. S. Bureau of the Census

derived from railroads and public utility corporations operating property classified as "operative" on the State Controller's annual statement of values of property. The location from which this portion of the state revenue comes is approximately indicated by the location of "operative property."

Appendix G contains a tabulation showing the total assessed valuation of all "operative property" in the north and south districts for each year from 1912 to 1924, inclusive. It is found that the percentage of operative property in the southern counties started at 45.3 per cent in 1912, reached as low as 37.5 per cent in 1919, and ended at 46.5 per cent in 1924, with an average of 44.3 per cent for the 13 years.

This indicates that, as nearly as can be determined, the bond built roads are now being paid for at the rate of 53.5 per cent in the north and 46.5 per cent in the south. To the end of fiscal year 1924 only $18,630,629 of the principal and interest on bonds had been paid, leaving a balance of $133,404,550 to complete the $152,035,179, ultimately to become due.

During 1926 the total payment on bond indebtedness will be $4,931,350, decreasing gradually thereafter over a period of 41 years. The future state taxes to retire the bond and interest debt should be reckoned along with motor vehicle taxation for new construction.

DISTRICT ORIGIN OF MOTOR VEHICLE REVENUES.

The state's revenue for maintenance and reconstruction arises from motor vehicle and gasoline taxes which can be readily traced to the districts. The tabulation found in Appendix E shows the relative proportion of such revenue coming from each district each year. During 1924 the northern districts contributed approximately 42.7 per cent and the southern districts 57.3 per cent. The tabulation indicates that at present registration is increasing more rapidly in the south than in the north.

EFFECT OF PROPOSED MOTOR VEHICLE REVENUE FOR CONSTRUCTION.

While construction funds were being derived from corporation taxes through bonds, the southern counties, as shown above, were contributing an average of probably 44 to 45 per cent and receiving an average over the period of 34 per cent.

The committee's recommendation for financing new construction from taxes on the user of motor vehicles will increase the proportion of the total construction expense contributed by the southern counties in 1926 to 46.5 per cent of $4,931,350 bond payments, and 57.3 (or more) per cent of $10,000,000 to come from motor vehicle sources, which would be equivalent to 53.7 per cent of the combined construction tax in that year. This rightly causes people of the southern territory to insist upon some more equitable arrangement for distributing benefits than has existed in the past.

OTHER SUBDIVISIONS OF THE STATE.

Similar studies of other sections of the state of smaller area, but containing large population and wealth and contributing large revenue, would undoubtedly show similar inequalities, but in the absence of complaints from such sections they are not here analyzed. All centers of wealth and population must accept certain responsibilities for those state improvements of general statewide necessity and use, otherwise there could be no state highway system, nor state government.

PRINCIPLES OF APPORTIONMENT.

The foregoing raises the question as to whether state highway funds should be allocated strictly in accordance with the source from which they come. If this principle were correct, the next step would logically be to allocate expenditures to still smaller subdivisions of the state in accordance with source of revenue, which would be the counties. If this were done, we would be back to the principle governing prior to the existence of the state highway system, when road funds were raised and expended in each county independent of every other county, with the result that there was neither uniformity nor continuity of improvement, and continuous highways existed in name only.

This causes us to seek a middle ground somewhere between the principle of indiscriminate state wide apportionment of funds without regard to source or importance of road and the principle of allocating all expenditures back to the source of revenue.

Considering the apportionment of federal aid funds we find that if congress had apportioned funds to the states in accordance with the ratio in which each paid revenue to the government, a few of the very wealthy eastern states, with relatively small area, would have received the largest part of the appropriations. This would have defeated the purpose of congress in establishing the federal aid system which was to promote the building of a connected system of roads throughout the country, and aid the states in constructing highways of national importance, which otherwise would have been long delayed.

To distribute the funds in what seemed to be a just manner, and in proportion to requirements of the undertaking congress provided that each appropriation should be apportioned to the states, one-third in proportion to land area, one-third in proportion to population and one-third in proportion to mileage of roads over which mail is carried. This takes no notice of the source of revenue, except as it may be reflected by population.

The federal aid principle of apportionment may not be applicable to our state highway system, but if for the sake of analysis we use the same principle we get the following result:

Factor	Northern District Percentage	1/3 X%	Southern District Percentage	1/3 X%
Area	52	17.33	48	16.0
Population	55	18.33	45	15.0
Public road mileage	60	20.00	40	13.33
		55.66%		44.33%

Such a system would tend to apportion funds to districts in proportion to their basic need for roads, without regard to relative amount or importance of work to be performed on the state highway system, and without considering source of revenue.

Recognition of the statewide necessity for a continuous and unified state highway trunk system forces the conclusion that such a system should be financed statewide, without regard to source of funds. This would be predicated upon such a system including only roads of unquestioned statewide necessity and use. If this principle were not recognized, we should abandon the idea of a state highway system.

The question then becomes one of making a proper selection of roads to comprise a system of statewide importance, and finding a means for taking care of such remaining roads as are found in the existing state highway system, but which are of doubtful importance from a statewide standpoint at our present stage of road development.

METHODS CONSIDERED BY COMMITTEE.

The question of apportionment of funds and roads to the various parts of the state has been a matter of grave concern to the committee, in that its satisfactory solution seriously affects the question of refinancing construction. The following methods have been considered by the committee:

First: The old system of allocation of funds according to the needs of the system, which has proven unsatisfactory to some parts of the state for the reasons recorded.

Second: Complete allocation of all construction funds to the two major districts of the state in proportion to the source of such funds. This method would ignore any statewide interest in a system of state trunk highways, and would ultimately lead to allocation of funds to counties as district units, and the abandonment of the principle of highway construction by the state.

Third: A partial remedy in the form of classification of roads in the state highway system, and such an allocation of funds to each classification as would concentrate construction upon the roads of the higher classification with a view to minimizing expenditure on roads of low classification, until the roads of greatest importance have been completed. Such a method would be an improvement over present conditions but would not solve the question for the future, nor provide for such progress as various parts of the state would demand on their roads of limited statewide importance.

Fourth: A district plan under which the state highway system would be classified into primary roads of unquestioned statewide necessity and use, and secondary roads including the remainder of the existing highway system. To the primary roads would be allocated such a proportion of the total construction funds as would provide for completion of the primary system well in advance of the secondary system, the primary funds to be used statewide on the primary system as found necessary to serve traffic. The remaining construction funds would be allocated to the secondary system and divided between the north and south districts of the state, in proportion to the source of such funds.

This fourth plan would recognize the state wide obligation for the roads of unquestioned state importance. It would at the same time permit of state construction of the roads of lesser importance now in the system, under conditions which would eliminate all argument between districts as to importance or mileage of roads in each district in the secondary system, or the order of construction thereon. The success of this plan would depend upon a proper future observance of its principles in the adding of roads to the system, to the end that no roads should be added to the primary system unless of undisputed state wide importance.

After a thorough study of the situation, the committee was generally favorable to the basic principles of the fourth plan above, referred to as the district plan, provided a suitable classification therefor could be agreed upon. The committee was finally unable to agree unanimously upon a classification of roads to be accepted for use under such a plan, one member only dissenting from the classification as shown elsewhere in this report.

The establishment through proper legal channels, of a classification of primary and secondary roads, is the key to a solution fair to all sections of the state, of the problem of allocation of funds.

We recommend that future state highway construction expenditures, in so far as possible, be concentrated on the primary system, and that construction be prosecuted by the State Highway Commission on the primary system at equal rates of annually completed highway mileage in each section of the state.

CONVICT CONSTRUCTION.

Throughout the state we have found an especial interest in the prison labor camps conducted by the state in cooperation with the Board of Prison Directors. While these camps have been in existence since 1916, they have come into especial prominence during the past eighteen months, due to the inauguration of the convict pay law. We have visited each camp now in operation, and have spent much time in consideration and discussion of this subject. We believe that essentially the ideas of the convict pay law are proper, and we are well pleased with the way it is working out.

The major benefits from the convict construction operation are in a relief to the state prisons of the cost of maintaining those convicts who are in the road camps, and in the benefits to the men themselves, who, through training in useful labor, with the attending discipline at the camps, are prepared in some measure to resume their place in society at the expiration of their sentence. This, in itself, is a justification of the system.

Under present methods, the Highway Commission is expending about $4 per day for each prisoner in camp. Of this money, $2.10 is placed to the credit of the prisoner, the balance being devoted to the wages of free men, purchase and operation of equipment, machinery, etc., necessary to properly prosecute the work.

Camps are operated on the honor system in isolated locations on mountainous or heavy grading work where they are the most efficient and where other conditions are favorable.

The benefits of operating prison camps are sufficiently demonstrated to justify placing more prisoners in highway camps. If funds were provided, we see no reason why the prison camps should not be expanded or additional camps created. The camps should be financed, either by direct legislative appropriation or by the Highway Commission, from other funds provided for highway construction, so that not less than 1000 prisoners could be constantly in camp. Under the present policies of operation, this would require an annual outlay of about $1,200,000.

If future highway construction is to be financed from revenues from motor vehicles, the amount saved to the prisons in upkeep costs for men sent to the camps should be credited to the highway funds from which the camp expense is paid. There is under the present system a relief to the general state revenues, which amount properly should be paid to the highway funds. Funds collected from the motor vehicle user should not be devoted to any other function of state government than highway construction and maintenance, and, therefore, revenues from sources of taxation for general state purposes should defray the cost of upkeep of prisoners at road camps, in amount equal to the expenditures the state would make to maintain the same number of prisoners in the penitentiaries.

Therefore, we recommend that the convict labor camps be expanded or increased in number, to utilize at least 1000 prisoners on highways, the cost to be payable from any moneys in the highway construction funds, and that the savings in prison maintenance expense be paid from general state funds to the highway fund from which operation of convict camps is defrayed.

LAND SUBDIVISION.

The development of the state and increase in population brings about much subdivision of property holdings adjacent to the state highways. The Highway Commission, early in the construction period, determined upon a minimum width of 60 feet for state highways, and, with few exceptions, this width has been secured.

In 1924, due to experience in reconstruction and widening of highways, the Commission amended the ruling of 1912 to increase the width on new state highway right of way to a minimum of 80 feet. Due to increase of traffic in sections susceptible of subdivision, the original width is found, in many localities, to be inadequate. Width of right of way for future state highways should provide for probable future necessity for increase in width of roadbed.

Provision for increased width of right of way should be made prior to filing of land subdivision plots.

Some subdividers voluntarily, at the request of the State Highway Commission, provide additional highway width, but the absence of legal requirement in this regard in the past now makes it practically impossible to increase the width of some of the highways adjacent to cities, as will be found necessary in the future.

In the laying out of new subdivisions on state highways, destined to carry large volumes of through traffic, greater care must be exercised in arrangement of intersecting streets for protection of local residents and through traffic as well. So far as practicable, the street entrances to the highway should be farther apart and at points of minimum danger.

There are many local public movements on foot adjacent to the large cities of this and other states, to acquire highway rights of way from 100 to 250 feet in width.

We recommend that statutes be enacted to require approval of the State Highway Commission, before filing with the county clerk, of any subdivision plot of land fronting on a state highway.

SUMMARY OF RECOMMENDATIONS.

1. We recommend that the present revenue acts providing funds for reconstruction be so amended as to give the Highway Commission authority to relocate and realign constructed roads.

2. We recommend that maintenance be extended by law to all unconstructed state highways open to travel; this for the reason that many years will elapse prior to construction of all the state highways, and the best possible road service should in the interim be furnished.

3. We recommend that the reconstruction work now being carried on by the state should be continued as rapidly as funds can be made available, to the end that previous investments in light types of construction may be saved and present dangerous conditions eliminated.

4. We recommend that on account of the requirements for maintenance and the urgency of reconstruction needs, due to traffic conditions, the existing revenues for maintenance and reconstruction purposes be not reduced in amount or rate of revenue.

5. We recommend that no highway should be improved in excess of its earning capacity, and that the program for state highway development should contemplate stage construction.

6. We recommend that the policy of the state should be to assume all future costs of construction on both minor and major structures on the state highway system, accepting such donations as may be offered.

7. We recommend that the State Highway Commission should more freely exercise its rights of condemnation and not permit important projects to be postponed on account of delay in acquiring rights of way, and that it should be the policy of the Highway Commission to assume all future costs of rights of way, accepting such donations as may be offered.

8. We recommend that a rate of progress should be adopted which will provide for the completion of construction on the present state highway system within a period of twelve to fourteen years, which will require revenues in the amount of $10,000,000 in 1926, increasing annually thereafter.

9. We recommend a classification of the roads in the present highway system into two general systems hereafter designated as primary system and secondary system. Classification has been made in accordance with the importance of the various highways based on their functional use.

The primary system to consist of:

Class "A."

1. Intercity highways.
2. Major interstate connections.

Class "B."

3. County seat laterals.
4. Other important lateral connections.
5. Major recreational highways.

The secondary system to consist of:

Class "C."

6. Minor interstate connections.
7. Minor recreational highways.
8. Local development highways.

10. We recommend that the primary system consist of the roads outlined in red and that the secondary system consist of the roads outlined in green upon the maps hereto attached and made a part hereof, which classification is listed in detail on the tabulation herewith.

11. We recommend that not less than 75 per cent of construction funds be devoted annually to the construction of the primary Class A and Class B road system until completed.

12. We recommend that the following ten roads be made state highways, and classified as a portion of the primary system:

Class A Primary.

1. Crescent City to the Oregon line, near Chetco, Coast route, 19 miles.
2. Bakersfield to Mojave, 65 miles.
3. Needles to Arizona line near Topock, 16 miles.
4. Blythe to Arizona line near Ehrenberg, 4 miles.
5. Shavers Wells to Route 26 near Coachella, 18 miles.
6. San Rafael to Point San Quentin, 3 miles.
7. San Diego to Tia Juana, 7 miles.

Class B Primary.

8. Oxnard to the main coast highway, 2 miles.

9. Alturas to the Oregon line near New Pine Creek, 44 miles.

10. Route 23 near Coleville to the Nevada state line, 12 miles.

13. We recommend that no other additions be made to the primary system, and that any additional roads which, in the opinion of the legislature, should be included in the state highway system prior to the completion of the primary system, be classified into the secondary system.

14. We recommend as a procedure for adding roads to the system, that any district or county asking for the inclusion of additional roads to the highway system should make survey, plans and estimates of the cost of same in proper form and submit to the California Highway Commission, which, in turn, should submit the same to the first succeeding session of the legislature, with its recommendations as to importance and classification.

15. We recommend that the financing of state highway construction be changed from the expensive long-term-bond method to the "pay-as-you-go" method as rapidly as it can be effected.

16. We recommend the immediate refinancing of state highway construction by one or more methods which will insure a revenue of approximately $10,000,000 for the year 1926 with annual amounts increasing each year thereafter at the same rate as the increase in motor vehicle registration, such revenue to be in addition to such construction revenue as may be made available from federal aid or supplementary bond issues.

17. We recommend that the revenue for this construction program be derived from increased taxes upon the users of motor vehicles, either by increasing the plate tax, by a graduated weight tax, or by an increased tax on gasoline, or a combination of these forms of tax.

18. We recommend the selection of that form of taxation on motor vehicles which will be the most equitable and the most acceptable to those who pay the tax.

19. We recommend that increases in motor vehicle revenue be made available entirely to the state for highway construction.

20. We recommend that steps be taken by the legislature, preliminary to placing before the voters at the next general election, a bond issue of $25,000,000 in short term bonds, all proceeds of which shall be used on the primary road system for the construction of major bridges and to defray the state's portion of the cost of the elimination of railroad grade crossings, in cooperation with railroads, the division of expense to be fixed by the California Railroad Commission for each grade crossing elimination project.

21. We recommend that future state highway construction expenditures, in so far as possible, be concentrated on the primary trunk system, and that construction be prosecuted by the State Highway Commission on the primary system at equal rates of annually completed highway mileage in each section of the state.

22. We recommend that the convict labor camps be expanded or increased in number, to utilize at least 1000 prisoners on highways, the cost to be payable from any moneys in the highway construction funds, and that the savings in prison maintenance expense be paid from general state funds to the highway fund, from which operation of convict camps is defrayed.

23. We recommend that statutes be enacted to require approval of the State Highway Commission before filing with the county clerk of any subdivision plat of land fronting on a state highway.

ARTHUR H. BREED, *Chairman.*
ELMER P. BROMLEY.
LOUIS EVERDING.
R. M. MORTON.
GEORGE G. RADCLIFF.
*ARTHUR E. LODER.
J. H. NEWMAN.

W. F. MIXON, *Secretary.*
February 20, 1925.

*My approval of these recommendations is as an individual, and reflects no policy of the organization with which I am officially connected.

ARTHUR E. LODER.

APPENDIX A.

CHAPTER 241.

An act providing for a comprehensive study of the state highway system of the State of California and providing for the appointment of an advisory committee to cooperate in making a study for the purpose of making a recommendation for the extension or reduction of the state highway system and for future financing of the same.

[Approved May 28, 1923.]

The people of the State of California do enact as follows:

SECTION 1. WHEREAS, The State of California, through the electors, approved in 1909 an issue of bonds to the extent of eighteen million dollars which was expended by the state highway commission in the construction of a system of state highways, and

WHEREAS, The State of California, through the electors, approved in 1915 an additional issue of bonds to the extent of fifteen million dollars for the purpose of improving the system of state highways, at which time certain additional highways were added to the state highway system as laid out under the provisions of the state highways act of 1909, and

WHEREAS, The State of California, through the electors, approved in 1919 a further additional issue of bonds to the extent of forty million dollars, which was to be devoted to the completion of the state highway system as it theretofore existed, and for the construction of additional highways authorized in 1919, and

WHEREAS, From time to time by enactment of legislature, additional highways have been added to the state highway system, and

WHEREAS, The state highway system now consists of approximately six thousand four hundred miles of highways, of which less than four thousand miles has been graded and less than two thousand five hundred miles has been paved, and

WHEREAS, An audit recently made by the state board of control shows less than six million dollars remaining in the third bond issue fund which can be devoted to the completion of the state highway system, and

WHEREAS, Large amounts of money are required annually for the maintenance of the state highway system, and

WHEREAS, Still greater sums of money will be required in the near future for the reconstruction of many sections of completed highways which are inadequate to stand up under present traffic, and

WHEREAS, The amount of traffic on the state highway system has doubled in the past five years and has quadrupled since the inception of the state highway project, and

WHEREAS, The state highway engineer now estimates that two hundred million dollars will be required to complete the state highway system as it now exists in accordance with standards demanded by present traffic, and

WHEREAS, The entire problem of the location and construction of highways and the financing of same is recognized to be on a basis of uncertainty which is incompatible with the requirements of the State of California; therefore

SEC. 2. The governor of this state is hereby authorized to appoint a committee of not more than seven residents of the State of California to act in conjunction with a member of the California highway commission and the state highway engineer, for the purpose of making a complete study of the whole state highway situation for the purpose of rendering a report to the governor for the benefit of the forty-sixth session of the legislature, which report will embody their recommendation for the best methods of outlining a proper system of California state highways, together with a plan for financing the same, and such other matters as may be incidental to those herein stated. Said committee acting in conjunction with the member of the California highway commission and the state highway engineer shall investigate the general location of each of the several units of the state highway system, including both constructed and unconstructed highways, also the question as to whether they should be paved or otherwise improved, also the question as to the advisability of eliminating from the state highway system any certain road or roads, also the necessity of the acquisition of any additional road or roads to be made a part of the state highway system, also the question of methods of obtaining revenues necessary for the construction of the state highway system as outlined. The report shall include recommendation as to the rate of time at which the state highway system can be constructed and the time which it will require to bring the state highway system to a state of completion.

SEC. 3. The committee above designated shall consist of:

One member of the senate of the State of California;

One member of the assembly of the State of California;

One member of the board of control of the State of California;

Four members at large.

SEC. 4. The members of the committee herein authorized to be appointed shall serve without compensation.

APPENDIX B.

THE ROAD SITUATION PRIOR TO 1909.

The early roads of California followed the lines of least resistance and were the result of temporary expedients, born of necessity and applied by explorers and fortune seekers who did not expect to remain long. This indifferent attitude toward the early trails continued through the periods of settlement and was responsible for roads which were classed as wretched at the time the bicycle became popular and caused a demand for improvement.

The records show that during the eleven years from 1885 to 1895, inclusive, the counties had begun to improve conditions materially. During that period the counties of the state expended a total of $18,000,000 for roads and bridges, most of which was for "working the roads" in a more or less makeshift manner. It was only in the more progressive counties that any permanent improvement was accomplished.

With the increase in population and development, the administration of roads by the counties continued steadily to improve and likewise the expenditures to increase, which, in 1921, reached a peak of $25,749,000 for the year.

THE FIRST STATE HIGHWAY PLAN.

The first action of California looking toward a system of state highways was taken in 1895, when a bureau of highways, with three commissioners, was created. These men traveled separately by team over the principal roads of the state, visiting every county and covering together a total of 16,000 miles in two years. They reported the state to have, at that time, approximately 45,000 miles of public road. In the year 1923, we find this had increased to 77,000 miles.

The commissioners in 1896 recommended classifying the public roads of the state into three groups as follows:

1. State highways.
2. County thoroughfares.
3. District roads.

Although the horse, at that time, was the only motive power and the range of travel small, the commissioners officially recognized, for the first time, the state's obligation to improve a connected system of through trunk lines of travel which were beyond the means of the many sparsely settled areas through which such roads would pass.

The commissioners of the Bureau of Highways selected and described twenty-eight roads comprising 4500 miles, which they recommended should be organized into a state highway system to be built and maintained at state expense. Despite the fact that no state highway system was created at that time, their recommendations for the most part forecast the state highway system of today and pointed the way to a public improvement which was later to do more for the upbuilding of California than any other single undertaking.

It is interesting to note that at that time automobiles were little known and had not come into general use as a means of travel. This is illustrated by the fact that the Commission made no recommendation for any state highways connecting the settled portions of southern California with the eastern border of the state, where there is now a strong demand for improved interstate highways. This is an example of the way in which the coming of the automobile later changed routes of travel on the highway map of the entire country.

The remarkable change which has taken place since 1896 in the required standards of construction and the cost of road work, due for the most part to the general use of automotive transportation, is shown by comparing present day costs of from $30,000 to $40,000 per mile with the estimate reported by the first Bureau of Highways for its proposed state system. Costs were estimated at an average of approximately $3,000 per mile as follows:

Estimated cost proposed state highway system 1896
exclusive of bridges over 15-foot span.

20% of 4,500 miles,	900 miles at	$500 00 per mile	$450,000 00
20% of 4,500 miles,	900 miles at	2,000 00 per mile	1,800,000 00
15% of 4,500 miles,	675 miles at	3,250 00 per mile	2,193,750 00
45% of 4,500 miles,	2,025 miles at	4,500 00 per mile	9,112,500 00
Total and average:	4,500 miles at average	$3,012 50 per mile	$13,556,200 00

EARLY REQUIREMENTS FOR STATE ROADS.

The Bureau of Highways at that early date described its proposed system as complying with the following four fundamental principles, which are still a good test for any state highway system:

"*First*—They are laid out along those lines which the physical features of the state forever fix as the easiest lines of communication;

"*Second*—The great belts of natural wealth which our state possesses are each traversed by one or more highways;

"*Third*—The system connects all the large centers of population within the limits of the state;

"*Fourth*—The system reaches the county seat of every county, and taps the lines of county roads so as to utilize them to their fullest extent."

To finance the state highways, the Bureau recommended an ad valorem tax of one-fourth mill on the dollar, which at that time would have provided only approximately $316,000 annually, permitting the work to progress slowly on a "pay-as-you-go" basis.

When these proposals emerged from the legislature of 1897 they were so modified as to admit an unlimited mileage, including even the most unimportant local roads. The proposed financing also was modified in such a way as to give counties control of a large proportion of the proposed new revenue. The result was a veto of the measure, which ended the first attempt at establishing a state highway system in California.

APPENDIX "C"

Estimated Cost
of
Constructing Uncompleted Portions
of
State Highway System

(a) Primary Roads
(b) Secondary Roads
(c) Recommended Additional Roads

STATE OF CALIFORNIA

CALIFORNIA HIGHWAY COMMISSION

ESTIMATED COST OF CONSTRUCTING UNCOMPLETED PORTIONS OF STATE HIGHWAY SYSTEM

PRIMARY ROADS

RTE. NO.	DESCRIPTION	RIGHT-OF-WAY GRADING AND MINOR STRUCTURES		ROCK OR GRAVEL SURFACING		PAVING		ROAD CONSTRUCTION TOTALS		MAJOR STRUCTURES Cost	R.R. GRADE SEPARATIONS	TOTAL COST	CONTINGENCIES 10%	TOTAL	ADMINISTRATION & ENGR. 11-1/9%	GRAND TOTALS
		Length Miles	Cost	Length Miles	Cost	Length Miles	Cost	Length Miles	Cost		Cost					
	45 NORTHERN COUNTIES															
1	San Francisco to Oregon Line near Monumental	52	$ 2,300,356	287	$ 1,775,800	250	$ 9,959,600	292	$14,035,756	$ 1,610,600	$ 963,000	$16,609,356	$1,660,936	$18,270,292	$2,030,032	$20,300,324
2	San Francisco to San Luis Obispo Co. Line	2	1,500			2	64,300	2	65,800	1,044,500	500,000	1,610,300	161,030	1,771,330	196,814	1,968,144
3	Sacramento to Oregon Line (East Side)	1	12,370	9	87,965	106	3,936,530	106	4,036,865	1,276,360	1,187,000	6,502,225	650,223	7,152,447	794,716	7,947,164
4	Sacramento to Tulare Co. Line (Valley)	42	223,033	8	22,800	39	1,350,723	42	1,596,556	966,000	1,432,500	3,995,056	399,505	4,394,561	488,285	4,882,846
5	Stockton to Santa Cruz via Oakland	18	493,052	1	2,190	18	734,264	18	1,229,506	490,500	885,000	2,605,006	260,501	2,865,507	318,390	3,183,896
6	Woodland Junction to Sacramento	1	14,310	1	2,700	1	30,375	1	47,385		50,000	97,385	9,738	107,123	11,903	119,026
7	Benicia to Tehama Junction (West Side)	1	13,480			1	35,900	1	49,380	74,650	200,000	324,030	32,403	356,433	39,604	396,037
8	Ignacio to Cordelia		7,000			9	324,800	9	331,800	110,000	240,000	681,800	68,180	749,980	83,331	833,311
10	Hanford to Tulare Co. Line															
11	Sacramento to Nev.Line (via Placerville)	73	1,155,467	24	227,600	68	1,241,420	73	2,624,487	7,720	680,000	3,312,207	331,221	3,643,428	404,825	4,048,253
13	Salida to Sonora	9	28,736	9	22,450	9	202,050	9	253,236		80,000	333,236	33,323	366,560	40,729	407,288
14	Oakland (Albany) to Martinez	2	60,240	2	20,535	3	155,155	3	235,930	24,250		260,180	26,018	286,198	31,800	317,998
15	Rte. 1 near Calpella to Colusa	57	1,416,178	79	812,672	9	165,100	87	2,393,950	279,000	95,000	2,767,950	276,795	3,044,745	338,305	3,383,050
16	Hopland to Lakeport									60,000	40,000	100,000	10,000	110,000	12,222	122,222
17	Roseville to Nevada City						950		950		95,000	95,950	9,595	105,545	11,727	117,272
18	Merced to El Portal (via Mariposa)	12	845,500	55	411,450	55	2,194,400	55	3,451,350	199,000	50,000	3,700,350	370,035	4,070,385	452,265	4,522,650
20	Redding to Rte.1 near Arcata via Weaverville	49	1,733,600	101	690,200	8	225,000	101	2,648,800	482,250	85,000	3,216,050	321,605	3,537,655	393,073	3,930,728
21	Rte.3 near Richvale to Quincy	84	5,832,055	84	836,000		265	84	6,668,320	440,000		7,108,320	710,832	7,819,152	868,795	8,687,947
22	San Juan Bautista to Hollister										95,000	95,000	9,500	104,500	11,611	116,111
23	Mono Co.Line to Rte.11 Alpine Jct.via Bridgeport	51	2,252,400	51	359,800			51	2,612,200			2,612,200	261,220	2,873,420	319,269	3,192,689
24	Rte. 4 near Lodi to San Andreas	11	60,208	1	2,760	37	556,880	37	619,848		140,000	759,848	75,985	835,833	92,870	928,703
25	Nevada City to Downieville		610	46	231,800			46	232,410	17,000		249,410	24,941	274,351	30,483	304,834
28	Redding to Alturas	93	2,185,500	93	858,100			93	3,043,600	321,750		3,365,350	336,535	3,701,885	411,321	4,113,206
29	Red Bluff to Susanville	51	1,430,100	51	412,500	19	229,200	66	2,071,800	124,250		2,196,050	219,605	2,415,655	268,406	2,684,061
32	Rte. 4 near Califa to Gilroy	5	72,562	5	53,500	30	985,151	30	1,111,213	284,600	125,000	1,520,813	152,081	1,672,894	185,877	1,858,771
34	Rte. 4 near Arno to Jackson	9	52,129	4	9,040	34	570,490	34	631,659		235,000	866,659	86,666	953,325	105,925	1,059,250
37	Auburn to Truckee	42	2,211,870	48	287,100	73	2,711,880	73	5,210,850	149,000	270,000	5,629,850	562,985	6,192,835	688,093	6,880,928
38	Meyers to Nevada Line (via Truckee)	54	1,080,910	67	263,880	67	1,661,140	67	3,005,930	288,500	50,000	3,344,430	334,443	3,678,873	408,763	4,087,636
42	Saratoga Gap to Redwood Park	20	749,937	20	201,700	20	302,550	20	1,254,187			1,254,187	125,419	1,379,606	153,289	1,532,895
44	Redwood Park to Boulder Creek	8	243,565	8	82,000	8	123,000	8	448,565			448,565	44,856	493,421	54,825	548,246
52	Tiburon to Alto	2	109,767	2	16,000	5	178,150	5	303,917		130,000	433,917	43,392	477,309	53,034	530,343
55	San Francisco to Rte.5 near Woodwardia	28	1,574,350	28	277,154	61	2,763,177	61	4,614,681			4,614,681	461,468	5,076,149	564,017	5,640,165
66	Manteca to Mossdale	4	23,320	4	8,200	4	150,060	4	181,580		75,000	256,580	25,658	282,238	31,360	313,599
	Total Primary 45 Northern Counties	781	26,184,105	1088	7,975,896	936	30,852,510	1478	65,012,511	8,251,930	7,702,500	80,966,941	8,096,694	89,063,635	9,895,959	98,959,594
	13 SOUTHERN COUNTIES															
2	Monterey Line to San Diego (Coast Route)	24	338,010	1	10,500	24	1,231,170	24	1,579,680	1,465,000	1,215,000	4,259,680	425,968	4,685,648	520,628	5,206,276
4	Fresno County Line to Los Angeles (Valley Rte.)	6	83,200			6	268,800	6	352,000	100,000	500,000	952,000	95,200	1,047,200	116,355	1,163,555
9	San Fernando to San Bernardino	20	182,920			20	938,660	20	1,121,580	50,000	595,000	1,766,580	176,658	1,943,238	215,915	2,159,153
10	Kings Co. Line to Sequoia Nat'l Park										300,000	300,000	30,000	330,000	36,667	366,667
12	San Diego to El Centro					39	1,572,800	39	1,572,800	42,300	140,000	1,755,100	175,510	1,930,610	214,512	2,145,122
19	Rte. 9 West of Claremont to Riverside										150,000	150,000	15,000	165,000	18,333	183,333
23	Saugus to Alpine Co. Line via Bridgeport	206	2,438,572	12	84,000	290	7,969,660	302	10,492,232	42,000	475,000	11,009,232	1,100,923	12,110,155	1,345,573	13,455,728
25	San Bernardino to El Centro	32	243,000	16	163,000	36	1,021,550	36	1,427,550	245,700	290,000	1,963,250	196,325	2,159,575	239,953	2,399,528
27	El Centro to Yuma	16	178,200	16	160,000	36	944,000	36	1,282,200	42,000	10,000	1,334,200	133,420	1,467,620	163,069	1,630,689
31	San Bernardino to Barstow	60	517,650	46	421,200	61	1,248,700	61	2,187,550	129,000	240,000	2,556,550	255,655	2,812,205	312,467	3,124,672
33	Rte. 4 near Bakersfield to Paso Robles	9	45,000	25	190,500	62	1,426,545	62	1,662,045	50,800	110,000	1,822,845	182,285	2,005,130	222,792	2,227,922
43	San Bernardino to Big Bear Lake	38	1,500,000	50	500,000	50	750,000	50	2,750,000	24,000	115,000	2,889,000	288,900	3,177,900	353,100	3,531,000
58	Mojave to Needles via Barstow	240	1,564,900	240	2,395,000	240	2,874,000	240	6,833,900	80,000	280,000	7,193,900	719,390	7,913,290	879,254	8,792,544
60	Oxnard to San Juan Capistrano	59	1,299,600	55	412,400	82	4,311,000	82	6,023,000	490,000	160,000	6,673,000	667,300	7,340,300	815,589	8,155,889
64	Shaver's Wells to Blythe	77	428,000	77	760,000	77	1,140,000	77	2,328,000			2,328,000	232,800	2,560,800	284,533	2,845,333
	Total Primary 13 Southern Counties	737	6,819,052	538	5,096,600	1023	25,696,885	1035	39,612,537	2,760,800	4,580,000	46,953,337	4,695,334	51,648,671	5,738,740	57,387,411

STATE OF CALIFORNIA

CALIFORNIA HIGHWAY COMMISSION

ESTIMATED COST OF CONSTRUCTING UNCOMPLETED PORTIONS OF STATE HIGHWAY SYSTEM

SECONDARY ROADS

RTE. NO.	DESCRIPTION	RIGHT-OF-WAY GRADING AND MINOR STRUCTURES		ROCK OR GRAVEL SURFACING		PAVING		ROAD CONSTRUCTION TOTALS		MAJOR STRUCTURES Cost	R.R. GRADE SEPARATIONS	TOTAL COST	CONTINGENCIES 10%	TOTAL	ADMINISTRATION & ENGR. 11-1/9%	GRAND TOTALS
		Length Miles	Cost	Length Miles	Cost	Length Miles	Cost	Length Miles	Cost		Cost					
	45 NORTHERN COUNTIES															
10	San Lucas to Hanford	42	$ 913,350	39	$ 315,450	9	$ 272,600	51	$ 1,501,400		$ 325,000	$ 1,826,400	$ 182,640	$ 2,009,040	$ 223,227	$ 2,232,267
13	Sonora to Mono County Line	67	398,850	17	68,000	2	49,250	67	516,000			516,100	51,610	567,710	63,079	630,789
15	Colusa to Cisco	68	1,319,635	68	582,300	43	897,530	68	2,799,465	439,300	100,000	3,338,765	333,877	3,672,642	408,071	4,080,713
18	Sequoia to Yosemite National Park	6	221,810	6	54,100	6	81,150	6	357,060			357,060	35,706	392,766	43,641	436,407
22	Hollister to Rt. 32 at San Felipe	4	4,100			5	111,767	5	115,867	35,000		150,867	15,087	165,954	18,439	184,393
24	Big Trees to Rte.23 at Silver Creek	52	457,600	52	104,000			52	561,600			561,600	56,160	617,760	68,640	686,400
28	Alturas to Nevada State Line	13	198,000	25	216,000	9	108,000	25	522,000	15,000		537,000	53,700	590,700	65,633	656,333
29	Susanville to Nevada State Line	30	384,800	39	314,400	52	621,600	52	1,320,800		85,000	1,405,800	140,580	1,546,380	171,820	1,718,200
34	Jackson to Rte. 23 at Picketts Junction	72	653,400	72	108,900			72	762,300			762,300	76,230	838,530	93,170	931,700
35	Peanut to Kunz	31	15,600					31	15,600			15,600	1,560	17,160	1,907	19,067
36	Downieville to Mt. Pleasant	6						6								
39	Tahoe City to Nevada Line	1	16,900	12	116,000			12	132,900			132,900	13,290	146,190	16,243	162,433
40	Rte. 13 near Montezuma to Mono Co. Line	53	1,985,220	47	472,000	47	708,000	53	3,165,220			3,165,220	316,522	3,481,742	386,860	3,868,602
41	Kings River Canyon Road	20	44,500					20	44,500			44,500	4,450	48,950	5,439	54,389
45	Willows to Rte. 3 near Biggs	18	180,005	18	173,900	30	358,320	30	712,225	626,400	100,000	1,438,625	143,863	1,582,488	175,832	1,758,319
46	Rt.1 near Mo.Klamath R.to Rt.3 at Klamath R.Br.	119	5,416,000	119	819,000			119	6,235,000	329,500		6,564,500	656,450	7,220,950	802,328	8,023,278
47	Orland to Chico	10	59,400	10	71,280	13	414,600	14	545,280		100,000	645,280	64,528	709,808	78,868	788,676
48	McDonald to Mo. of Navarro River	39	892,400	51	510,500			51	1,402,900	54,000	30,000	1,486,900	148,690	1,635,590	181,732	1,817,322
49	Calistoga to Lower Lake	21	429,300	21	123,800	31	1,033,560	31	1,586,660	60,000		1,646,660	164,666	1,811,326	201,258	2,012,584
50	Lower Lake to Rumsey	25	919,200	25	265,000			25	1,184,200	6,000		1,190,200	119,020	1,309,220	145,469	1,454,689
51	Santa Rosa to Schellville					8	237,600	8	237,600		170,000	407,600	40,760	448,360	49,818	498,178
53	Fairfield to Lodi via Rio Vista	29	235,960	28	111,600	36	626,080	36	973,640	625,000	35,000	1,633,640	163,364	1,797,004	199,667	1,996,671
54	Near Michigan Bar to Drytown															
56	Carmel to San Luis Obispo Co. Line	67	4,108,600	67	677,100			67	4,785,700	361,000		5,146,700	514,670	5,661,370	629,041	6,290,411
65	Auburn to Sonora	87	1,616,010	87	872,300	87	1,046,760	87	3,535,070	580,000	160,000	4,275,070	427,506	4,702,576	522,508	5,225,085
67	Pajaro R.to Rte.2 near San Benito R. Bridge										65,000	65,000	6,500	71,500	7,944	79,444
	Total Secondary 45 Northern Counties	880	20,470,640	803	5,975,630	378	6,566,817	988	33,013,087	3,131,200	1,170,000	37,314,287	3,731,429	41,045,716	4,560,634	45,606,350
	13 SOUTHERN COUNTIES															
13	Tuolumne Co. Line to Junction Rte. 23	15	75,000					15	75,000	10,000		85,000	8,500	93,500	10,389	103,889
40	Tuolumne Co. Line to Rt.23 near Mono Lake	15	102,550	15	40,450			15	143,000			143,000	14,300	157,300	17,478	174,778
56	Monterey Co.Line to Cambria	16	205,900	16	204,400			16	410,300	62,000		472,300	47,230	519,530	57,726	577,256
57	Santa Maria to Freemans via Bakersfield	151	3,657,125	141	1,013,275	53	1,288,500	184	5,958,900	53,600	185,000	6,197,500	619,750	6,817,250	757,472	7,574,722
59	Lancaster to Baileys	37	196,100	37	185,000	12	240,000	37	621,100			621,100	62,110	683,210	75,912	759,122
61	La Canada to Mt. Wilson Rd. via Arroyo Seco	25	750,000			25	625,000	25	1,375,000			1,375,000	137,500	1,512,500	166,056	1,680,556
62	Azusa to Pine Flats in San Gabriel Canyon	28	980,000			28	700,000	28	1,680,000			1,680,000	168,000	1,848,000	205,333	2,053,333
63	Big Pine to Oasis	41	1,058,100	41	245,600			41	1,303,700		40,000	1,343,700	134,370	1,478,070	164,230	1,642,300
64	Mecca to Shavers Wells	15	208,000	15	160,000	15	240,000	15	608,000			608,000	60,800	668,800	74,311	743,111
	Total Secondary 13 Southern Counties	343	7,232,775	265	1,848,725	133	3,093,500	376	12,175,000	125,600	225,000	12,525,600	1,252,560	13,778,160	1,530,907	15,309,067
	R E C A P I T U L A T I O N															
	PRIMARY 45 NORTHERN COUNTIES	781	26,184,105	1088	7,975,896	936	30,852,510	1478	65,012,511	8,251,930	7,702,500	80,966,941	8,096,694	89,063,635	9,895,959	98,959,594
	PRIMARY 13 SOUTHERN COUNTIES	787	8,819,052	538	5,096,600	1023	25,696,885	1035	39,612,537	2,760,800	4,580,000	46,953,337	4,695,334	51,648,671	5,738,740	57,387,411
	TOTAL PRIMARY	1568	35,003,157	1626	13,072,496	1959	56,549,395	2513	104,625,048	11,012,730	12,282,500	127,920,278	12,792,028	140,712,306	15,634,699	156,347,005
	SECONDARY 45 NORTHERN COUNTIES	880	20,470,640	803	5,975,630	378	6,566,817	988	33,013,087	3,131,200	1,170,000	37,314,287	3,731,429	41,045,716	4,560,634	45,606,350
	SECONDARY 13 SOUTHERN COUNTIES	343	7,232,775	265	1,848,725	133	3,093,500	376	12,175,000	125,600	225,000	12,525,600	1,252,560	13,778,160	1,530,907	15,309,067
	TOTAL SECONDARY	1223	27,703,415	1068	7,824,355	511	9,660,317	1364	45,188,087	3,256,800	1,395,000	49,839,887	4,983,989	54,823,876	6,091,541	60,915,417
	PRIMARY 45 NORTHERN COUNTIES	781	26,184,105	1088	7,975,896	936	30,852,510	1478	65,012,511	8,251,930	7,702,500	80,966,941	8,096,694	89,063,635	9,895,959	98,959,594
	SECONDARY 45 NORTHERN COUNTIES	880	20,470,640	803	5,975,630	378	6,566,817	988	33,013,087	3,131,200	1,170,000	37,314,287	3,731,429	41,045,716	4,560,634	45,606,350
	TOTAL NORTH	1661	46,654,745	1891	13,951,526	1314	37,419,327	2466	98,025,598	11,383,130	8,872,500	118,281,228	11,828,123	130,109,351	14,456,593	144,565,944
	PRIMARY 13 SOUTHERN COUNTIES	787	8,819,052	538	5,096,600	1023	25,696,885	1035	39,612,537	2,760,800	4,580,000	46,953,337	4,695,334	51,648,671	5,738,740	57,387,411
	SECONDARY 13 SOUTHERN COUNTIES	343	7,232,775	265	1,848,725	133	3,093,500	376	12,175,000	125,600	225,000	12,525,600	1,252,560	13,778,160	1,530,907	15,309,067
	TOTAL SOUTH	1130	16,051,827	803	6,945,325	1156	28,790,385	1411	51,787,537	2,886,400	4,805,000	59,478,937	5,947,894	65,426,831	7,269,647	72,696,478
	GRAND TOTAL STATE	2791	62,706,572	2694	20,896,851	2470	66,209,712	3877	149,813,135	14,269,530	13,677,500	177,760,165	17,776,017	195,536,182	21,726,240	217,262,422

RECOMMENDED ADDITIONAL ROADS.

No.	Description	Length Miles	Estimated Cost
	45 northern counties.		
101	Crescent City to Oregon line near Chetco	19	$1,424,500
106	San Rafael to Point San Quentin	3	281,478
109	Alturas to Oregon line near New Pine Creek	44	1,156,222
	Subtotal 45 northern counties	66	$2,862,200
	13 southern counties.		
102	Bakersfield to Mojave	65	$908,722
103	Needles to Arizona line near Topock	16	883,911
104	Blythe to Arizona line near Ehrenberg	4	201,422
105	Shaver's Wells to Route 26 near Coachella	18	797,500
107	San Diego to Tia Juana	7	393,556
108	Oxnard to State Highway Route 2	2	158,889
110	Route 23 near Coleville to Nevada state line	12	313,133
	Subtotal 13 southern counties	124	$3,657,133
	Grand Total	190	$6,519,333

APPENDIX D

Ratio of Motor Vehicles to Population—1923, By Counties.

County	Estimated population 1923 U. S. Bureau Census	Total registration 1923	No. persons per car
Alameda	379,525	75,064	5.0
Alpine	243	34	7.2
Amador	7,793	1,400	5.6
Butte	31,015	9,413	3.3
Calaveras	6,183	1,312	4.7
Colusa	9,851	3,295	3.0
Contra Costa	61,889	11,908	5.2
Del Norte	2,883	771	3.7
El Dorado	6,426	1,744	3.6
Fresno	147,929	48,098	3.07
Glenn	13,541	3,515	3.78
Humboldt	38,694	9,611	4.02
Imperial	54,220	11,636	4.66
Inyo	7,051	1,906	3.7
Kern	61,017	23,289	2.62
Kings	24,121	7,309	3.3
Lake	5,402	1,602	3.37
Lassen	9,841	2,220	4.43
Los Angeles	1,092,314	432,486	2.52
Madera	13,586	3,963	3.43
Marin	28,144	5,657	4.97
Mariposa	2,775	599	4.63
Mendocino	24,183	4,958	4.87
Merced	27,978	8,032	3.48
Modoc	5,425	1,246	4.34
Mono	960	159	6.03
Monterey	29,361	8,054	3.64
Napa	20,994	4,987	4.21
Nevada	10,850	1,835	5.91
Orange	71,087	33,294	2.14
Placer	18,708	5,652	3.31
Plumas	5,832	1,077	5.42

County	Estimated population 1923 U. S. Bureau Census	Total registration 1923	No. persons per car
Riverside	55,920	15,830	3.53
Sacramento	99,402	27,661	3.59
San Benito	9,339	2,889	3.24
San Bernardino	79,418	24,367	3.26
San Diego	130,484	36,578	3.56
San Francisco	539,038	89,844	5.0
San Joaquin	90,423	25,055	3.6
San Luis Obispo	22,797	7,301	3.12
San Mateo	40,457	9,326	4.33
Santa Barbara	45,914	13,829	3.32
Santa Clara	106,854	31,802	3.36
Santa Cruz	26,315	8,618	3.05
Shasta	13,361	3,757	3.55
Sierra	1,783	378	4.7
Siskiyou	18,545	4,594	4.0
Solano	45,303	7,769	5.8
Sonoma	53,422	17,646	3.0
Stanislaus	51,139	16,845	3.0
Sutter	11,481	3,747	3.1
Tehama	13,415	3,490	3.9
Trinity	2,551	346	7.4
Tulare	67,536	22,040	3.1
Tuolumne	7,768	2,139	3.6
Ventura	32,464	10,166	3.3
Yolo	18,250	6,085	3.0
Yuba	10,494	3,462	3.0
Totals	3,813,704	1,121,690	3.40
Exemptions		17,558	----
Totals, 1923	3,813,704	1,139,248	3.35
Totals, 1924	3,940,000*	1,350,759	2.92

*Estimated.

APPENDIX E.

CALIFORNIA—MOTOR VEHICLE REGISTRATIONS

Percentage Comparison of Motor Vehicle Funds Distributed to Forty-five Northern and Thirteen Southern Counties on Basis of Registration.

Year	Total registration	Percentage distribution M. V. funds 45 northern counties	Percentage distribution M. V. funds 13 southern counties	
1914	148,225	45.4	54.6	
1915	190,196	47.0	53.0	
1916	266,439	47.4	52.6	
1917	341,333	48.7	51.3	
1918	397,447	50.6	49.4	56
1919	523,165	51.6	48.4	126
1920	606,487	51.1	48.9	83
1921	713,754	49.1	50.9	107
1922	897,132	46.9	53.1	184
1923	1,139,248	44.6	55.4	242
1924	1,350,759	42.7	57.3	211

APPENDIX F.

CALIFORNIA—TOTAL ASSESSED VALUATIONS, ALL PROPERTY

Including both operative and nonoperative.

Comparison in forty-five northern and thirteen southern counties.

(From records of State Controller's office.)

Year	State total	Forty-five northern counties		Thirteen southern counties	
		Amount	Per cent	Amount	Per cent
1912	$2,919,342,889	$1,771,892,171	60.7	$1,147,450,718	39.3
1913	3,114,136,640	1,857,519,319	59.6	1,256,617,321	40.4
1914	3,232,646,152	1,894,253,906	58.7	1,338,392,246	41.3
1915	3,311,446,744	1,942,033,711	58.7	1,369,413,033	41.3
1916	3,578,146,434	2,063,790,097	57.8	1,514,356,337	42.2
1917	3,722,606,407	2,141,564,757	57.5	1,581,041,650	42.5
1918	3,806,865,179	2,184,991,762	57.3	1,621,873,417	42.7
1919	4,023,009,588	2,303,060,457	57.3	1,719,949,131	42.7
1920	4,555,445,447	2,527,770,036	55.6	2,027,675,411	44.4
1921	4,929,479,508	2,676,324,201	54.3	2,253,155,307	45.7
1922	5,135,984,563	2,679,564,660	52.1	2,456,419,903	47.9
1923	5,716,358,058	2,814,031,586	49.2	2,902,326,472	50.8
1924	6,661,409,392	2,978,879,464	44.7	3,582,529,928	55.3
Totals	$54,706,877,001	$29,835,676,127	54.6	$24,871,200,874	45.4

APPENDIX G.

CALIFORNIA—TOTAL ASSESSED VALUATIONS, OPERATIVE PROPERTY ONLY

Comparison in forty-five northern and thirteen southern counties.

(From records of State Controller's office.)

Year	State total	Forty-five northern counties		Thirteen southern counties	
		Amount	Per cent	Amount	Per cent
1912	$443,811,424	$242,135,903	54.7	$201,675,521	45.3
1913	480,586,571	247,693,358	51.3	232,893,213	48.7
1914	505,584,639	260,475,255	51.5	245,109,384	48.5
1915	519,072,362	274,847,191	52.6	244,225,171	47.4
1916	661,291,338	375,383,146	56.7	285,908,192	43.3
1917	708,299,781	407,657,441	57.7	300,642,340	42.3
1918	685,867,422	399,384,516	58.3	286,482,906	41.7
1919	665,212,497	416,274,435	62.5	248,938,062	37.5
1920	769,383,164	436,757,339	56.7	332,625,825	43.3
1921	891,205,302	511,181,645	57.2	380,023,657	42.8
1922	934,608,560	517,118,990	55.3	417,489,570	44.7
1923	1,024,572,721	557,672,731	54.3	466,899,990	45.7
1924	1,142,325,829	612,192,358	53.5	530,133,471	46.5
Totals	$9,431,821,610	$5,258,774,308	55.7	$4,173,047,302	44.3

APPENDIX H.

ADDITIONAL ROADS PRESENTED TO COMMITTEE.

The roads listed and described following were presented to the committee by the supervisors of various counties or by other local sources with the request that they be considered in the committee's recommendations for additions to the state highway system.

The committee's discussion of this subject and recommendations are found in the body of the report.

These roads total in length approximately 3000 miles for the eighty-seven separate roads.

The total ultimate cost of improving these roads, according to probable future traffic requirements, has been roughly estimated for us by the state highway organization from the very meager information obtainable in the short time, at $117,000,000.

For convenience these routes have been numbered, and are shown on maps herewith submitted.

Brief descriptions of these routes follow, the lengths being only approximations in many cases:

101. Crescent City to the Oregon line. Length 19.0 miles.

This section is served by existing county road, which in construction would require relocation in some portions. The country is flat or gently rolling, and the road has the local traffic of a thriving farming community. This route furnishes connection with the Roosevelt highway in Oregon, now being improved by that state, and is a link in the all-coast road planned to ultimately extend to Astoria and Portland. Several large bridges will be ultimately required, and the improvements should be grading and rock surfacing with ultimate paving.

102. Bakersfield to Mojave. Length 65 miles.

This route is a gap in what would otherwise be a direct connection from the San Joaquin Valley to Mojave, Barstow and Needles. The road goes through the Tehachapi Pass, where also lies the combined S. P. and A. T. and S. F. railroads. The road is now well improved by paving in the valley sections and by rock and disintegrated surfacing on the mountainous sections. High standards of grading and paving will eventually be required.

103. Needles to Topock. Length 16 miles.

This route is proposed to extend the Barstow-Needles road to the Arizona state line at the Colorado River at the location of the interstate bridge. There is an existing county road, but reconstruction would require complete relocation. Construction would be difficult. Minimum standards of grading and paving would be required.

104. Blythe to Ehrenberg. Length 4.0 miles.

This route is proposed to extend existing state highway from Blythe to the Colorado River which is the state boundary. Construction features are difficult on account of the low area flooded by the Colorado River. Minimum standards of grading and paving would be required.

105. Coachella to Shavers Wells. Length 18 miles.

The proposed route will serve as a connection from state highway route, now described as running from Mecca to Blythe, and the main trunk highway from San Bernardino to Yuma, near Coachella. The connection afforded by this route would remove the proposed highway from the present location through Box Canyon, where construction costs would be exceedingly high, to a more direct and shorter connection with the main highway and across country where construction is easy and where good alignment and grades will be found. Ultimate traffic will require good standards for grading and construction.

106. San Rafael to San Quentin. Length 3.0 miles.

This route would serve traffic coming by ferry from Richmond to Point San Quentin and San Rafael. There is an existing road over low ground which would require regrading to raise and widen. The route would serve to distribute to the eastbay cities, traffic coming southerly on the Redwood highway from Marin and Sonoma counties.

107. San Diego to Tia Juana. Length 7.0 miles.

This route would extend from the town of Chula Vista, lying several miles south of San Diego, to the Mexican border at Tia Juana. The distance from San Diego to Chula Vista lies practically all within the cities of San Diego, National City and Chula Vista and is paved. From Chula Vista to Tia Juana, the road has been paved by San Diego County. The development of an alternate and parallel line between Chula Vista and Tia Juana would eventually be required on account of the heavy traffic. Country is not difficult for highway construction. High standards of grading and paving.

108. Oxnard to State Highway Route 2 (Main Coast Highway). Length 2 miles.

This route is proposed to connect the Oxnard-Capistrano road with the main Coast highway. It would follow for a portion of its length existing county pavement in Ventura County. For the balance, relocation would be necessary, with grade railroad crossing separation. Construction features are not difficult. High type of grading and paving would be required.

109. Susanville to the Oregon line via Alturas. Length 119.1 miles.

This route is composed of two routes: first, from Susanville to Alturas by way of the Madaline Plains (75 miles); second, by way of Alturas to the Oregon line by way of Newpine Creek (44 miles).

This road is considered important to Modoc and Lassen counties on account of being a link in a proposed through trunk line lying east of the Sierras. Traffic would be heavy in summer, good standards would be required.

110. Coleville to Nevada State Line. Length 12 miles.

This route would complete the connection from the state highway system near Coleville to the Nevada state line. A traveled county road now exists along the proposed route, which is considered interstate in character. No difficult construction problems are encountered, and good standards would be required.

111. Alton to Kuntz. Length 40 miles.

(See description under No. 213.)

112. San Francisco to San Jose by way of the Bay Shore. Length 41.5 miles.

This route would lie in San Mateo and Santa Clara counties, and would furnish a more direct route for Peninsular traffic than is possible on the present state highway. It would distribute traffic into San Francisco at San Bruno and Army streets, thereby aiding in relieving the serious congestion now existing in Daly City, Colma, Burlingame, and San Mateo. This route would shorten the distance somewhat between San Jose and San Francisco, and would require high standards of grading and paving. It would serve heavy local traffic in addition to the through traffic from the south and that traffic which will be added from the San Joaquin Valley region by completion of the Dumbarton bridge now under construction. Some construction difficulty is presented, particularly between Redwood City and San Francisco on account of the proposed location over marshy ground and tide flats. Between South San Francisco and San Mateo the longest and most difficult marsh section on the road is now being graded by funds furnished by San Francisco. Between South San Francisco and San Francisco city limits, there is an existing paved county road, little of which would be utilized in construction of a road built to maximum standards, of width of grade and paving.

That section of the Bay Shore highway from San Francisco to the south San Mateo County line has already been authorized to be taken over by the state for maintenance as a state highway after construction by local authorities, but no state funds can now be spent on its construction.

113. Oakland to Sacramento, via Rio Vista. Length 91.5 miles.

This route would have considerable portion of the distance lying on existing paved county roads. From Sacramento to Rio Vista the present road lies on levees and is paved. From Antioch, the road would lie for the most part on existing county roads and would utilize the present tunnel road into Oakland. Considerable improvement of standards of the present county roads would ultimately be required, as well as some additional construction and widening of present tunnel. High standards of grading and paving would be required.

113-A. Walnut Creek to Oakland, via Moraga Valley. Length 15.5 miles.

This route would for the most part require new location. It is proposed to enter Oakland by means of a new tunnel near the location of the present electric railroad tunnel, entering the city in the vicinity of Piedmont. Route would be useful for Sacramento, Contra Costa and San Joaquin counties' traffic, and would furnish additional means of communication with the eastbay cities, entering them at a favorable location to distribute traffic from Richmond to Alameda. Country is particularly difficult adjacent to the tunnel location, and high standards of grading and paving would be required, as well as a wide tunnel section.

114. From present state highway, county seat lateral Red Bluff to Susanville by way of Deer Creek Canyon, to Chico. Length 50 miles.

This road following down the drainage of Deer Creek would furnish a direct outlet from Lassen and a portion of Plumas counties to the Sacramento Valley, and by following down the drainage would avoid the summits between Red Bluff and Chester on the present state highway route. The character of country is mountainous, and heavy work would be required to grade to minimum standards, with crushed rock surface.

115. Palmdale southeast to Cajon Pass. Length 52.5 miles.

This route in conjunction with the Mojave to Bakersfield or the Lancaster-Bailey route, at present in the highway system, would furnish a direct route from San Bernardino and Riverside counties to the San Joaquin Valley. It lies on the north slope of the San Gabriel Mountains, and passes through an area susceptible to recreational use. At the summit of the route lies a large area set aside by the National Forest Service and Los Angeles County for a county park. The territory is served by existing county roads, about 12 miles of which are paved and an additional 12 miles graded and surfaced with granite. Construction conditions are difficult. Medium standards of grading with rock surfacing would be required.

116. Kingsburg to General Grant National Park. Length 55 miles.

This route would, by the use of existing county paved and graded roads, furnish a connection between the main valley trunk line and General Grant National Park, an area of 4 square miles, and containing the General Grant grove of big trees. Paved roads in Tulare County on the valley section of the route; from there up to the park, well kept county roads now serve traffic. Construction conditions through mountainous parts of the road would be difficult. Minimum standards of grading and disintegrated granite surfacing.

117. Lakeport to Upper Lake. Length 9.1 miles.

This route, lying in Lake County, would connect from the end of the present state highway county seat lateral at Lakeport to the proposed Tahoe-Ukiah road, at present a part of the highway system. There is an existing county road on this location. Country is not difficult for highway construction.

118. Lower Lake to Tahoe-Ukiah road. Length 7 miles.

This route would serve to connect the town of Lower Lake to the proposed route of the Tahoe-Ukiah road, and has been suggested as an alternate route for the already designated Rumsey-Lower Lake road, lying in Cache Creek canyon. Country is being developed as agricultural land. Construction is not classed as difficult. Minimum standards of grading and rock surfacing.

119. Ray to Wilbur Springs. Length 11.5 miles.

This route has been proposed as a substitute route for a portion of the Rumsey-Lower Lake route lying in Cache Creek Canyon, due to the impracticability of construction of a modern highway between Rumsey and Lower Lake (according to reports of the California Highway Commission's engineers). Country is difficult. Minimum standards of grading and rock surfacing.

120. Rumsey to Woodland. Length 35.1 miles.

This route, in Yolo County, would utilize existing county pavement for a few miles, then would lie over existing county road, with perhaps some relocation to Rumsey. Construction is not difficult. Minimum standards of grading and surfacing would be required.

121. Woodland to Yuba City. Length 39.5 miles.

This road would furnish direct connection between the east and west side of the Sacramento Valley, crossing both the Sutter by-pass and the Sacramento River. County roads exist for a portion of the distance. Flat valley construction. Bridge construction would be heavy. High standards of grading and paving would be required.

122. Woodland to Sacramento. Length 18 miles.

This road, in Yolo County, would furnish a new route between Woodland and Sacramento. For the most of the way, there is an existing county road, portions already paved. Crossing of the Yolo by-pass would be required. High standards of grading and paving.

123. Sacramento to Tudor. Length 40.1 miles.

This route is the "Garden Highway," portions of which were recently constructed by joint highway district including Sacramento and Sutter counties, with state participation from joint highway district funds established by the legislature in 1921. Additional paving and bridge construction would be required on high class standards.

124. Dunnigan to Vacaville. Length 42 miles.

This route would lie in Yolo and Solano counties, following in part existing county roads. It would furnish a short cut for the west side highway between points in the northern part of the Sacramento Valley and Carquinez Straits. Mostly flat valley construction. High class standards of grading and paving would be required.

125. Lincoln to Newcastle. Length 9.8 miles.

This route would serve as a short route between Newcastle, on the road from Roseville to Auburn and Colfax, and Lincoln on the east side highway. Much local and some through traffic would be served by this road. High standards of grading and rock surfacing would be required.

126. Sacramento easterly to the county line to connect with the Michigan Bar-Dry Town road. Length 21.5 miles.

This route would follow for the most part an existing county road, much of which has been paved, and other portions graded by Sacramento County. It would furnish a direct state highway connection from Sacramento to Plymouth and the towns along the mother lode in Amador County. Medium standards of grading and rock surfacing would be required on graded portions.

127. Dixon south to the Rio Vista-Suisun road. Length 18.5 miles.

This road would lie in Solano County and would furnish connection from Rio Vista to Davis and Woodland. Country is not difficult for highway construction. Minimum standards of grading and rock surfacing would be required.

128. Batavia south to Rio Vista-Suisun road. Length 12.5 miles.

(Same remarks apply to this road as number 127 above.)

129. Quincy to Sattley. Length 59 miles.

An unimproved county road exists along this route, which is a part of an east and west lateral into Nevada and connects Quincy with the Yuba Pass road. It would help develop a large recreational area and benefit the mining, lumbering and farming industries. Because of heavy summer travel, good standards are required, causing fairly heavy construction costs.

130. Napa Cut-off. Length 4.3 miles.

This route would lie in Napa County and constitutes a short cut between the Black Point Cut-off, west of Napa, and what is known as the Sacramento Wye, east of Napa. It would lie across low ground, and construction problems would be serious. High standards of grading and paving would be required.

131. Napa Junction to Vallejo. Length 7.5 miles.

This route would lie on existing county paved road from the so-called Napa or Sacramento Junction to Vallejo. High standards of grading and paving would be required. Railroad grade separations should be made.

131-A. American Canyon Cut-off. Length 14 miles.

This route would lie in Solano County and would utilize a favorable location through the hills south of Jamison Canyon, making a more direct connection between Cordelia, and Vallejo and the Carquinez Straits. At this crossing the through traffic is at present served by ferries, but construction of a suspension bridge is under way. Country presents fairly difficult construction features with some grades and heavy adobe soil. Value of the route would lie in shortening distance five miles.

132. Sears Point to Vallejo. Length 10.2 miles.

This route would connect Vallejo directly with the Black Point Cut-off, Marin County, and furnish a short route from Vallejo to Sausalito. Several large draw bridges would be required. The road would lie on flat country, presenting for the most part, good foundation features. High standards of grading and paving would be required.

133. Carquinez Bridge to Vallejo. Length 1.4 miles

This route would serve to connect the proposed bridge over the Carquinez Straits with the town of Vallejo. The existing road was privately built. No difficult construction problems. High standards of grading and paving would be required.

134. Benicia to Martinez Ferry. Length 1.6 miles.

This route would extend from the end of the present constructed state highway to a connection with the Benicia-Martinez Ferry slip, and would furnish a more direct connection than exists at present. No difficult construction features. High standards of grading and paving would be required.

135. Valdor to Weaverville. Length 10.8 miles.

There is an existing county road in this location which would be relocated in new construction. It is proposed for a state highway by Trinity County on account of the fact that surveys already made by the Highway Commission leading to construction of the Arcata-Redding lateral by way of the Trinity River, thereby, not passing through Weaverville. From Weaverville, the road crosses a summit on about 3200 feet elevation, locally known as Oregon Mountain, and thence descends into the canyon of the Trinity River, connecting with an already constructed state highway. Grading heavy. Rock surfacing.

136. Angel's Camp to Big Trees. Length 25 miles.

This route would extend from Angel's Camp or vicinity on the Mother Lode highway to the westerly end of the Ebbetts Pass road at the Calaveras Big Trees. The Ebbetts Pass road is a state highway by legislative enactment. The country is fairly difficult and minimum standards of grading and rock surfacing would be required.

137. Sonora to Groveland. Length 20 miles.

This route in Tuolumne County would serve as a short cut from Sonora to Groveland, thereby extending the Mother Lode highway already in the highway system. Groveland lies on the Big Oak Flat road, also in the highway system. The country is mountainous and difficult. Minimum standards of grading and surfacing required.

138. Modesto to Briceburg. Length 76 miles.

This route lying in Stanislaus and Mariposa counties would follow, for a portion of its length, existing county paved and graded highways. It would serve as a direct connection from Modesto to Briceburg, which is on the Merced River, 17 miles from the Yosemite National Park boundary, and would thus furnish an additional route into Yosemite Valley, more direct for lower San Joaquin and bay traffic than the state highway route by way of Merced and Mariposa. Country on the portion of the road which would require new construction is difficult. High standards of grading and paving would be required.

139. Tracy to Fresno. Length 141 miles.

This route, which would leave the Stockton to Hayward state highway at Tracy, would lie partially on existing county highways. Some paved, on the west side of the San Joaquin River by way of Mendota to Fresno. Flat valley country. Some relocation of existing county roads would ultimately be necessary in San Joaquin County. Resurfacing work is needed in Fresno County. High standards of grading and paving would be required, and ultimately improvement would he required on existing county pavements.

140. Chester to Indian Falls. Length 33.9 miles.

This route would connect Plumas County and Quincy with state highway lateral route from Red Bluff to Susanville. This territory is now served by a good county road, and the location is not difficult, considering mountainous country. Minimum standards of grading and rock surfacing.

141. Dumbarton Cut-off. Length 16 miles.

This route is proposed to utilize the proposed Dumbarton bridge, construction of which seems assured. It will make a short route between the Peninsula and Alameda County. In connection with the Niles Canyon road, it will draw traffic from the easterly parts of Alameda County and the San Joaquin Valley. Construction will be expensive on account of the low country.

142. Junipero Serra Boulevard Extension. Length 3.8 miles.

This route is proposed to branch from the Peninsular highway several miles south of the town of Colma and by a location lying west of the cemeteries and the town of Colma, connect with the Junipero Serra Boulevard Extension at the city limits of San Francisco. No especially difficult construction features, except right of way. High standards of grading and paving will be required.

143. San Francisco to Santa Cruz by way of the Shore Line. Length 90 miles.

This route is proposed as a coast line road between San Francisco and Santa Cruz. Through San Mateo County, there is an existing county highway, partially improved. The country is difficult for highway construction. High standards of grading and paving would be required.

144. Redwood Park to the Coast. Length 8 miles.

This route as an outlet for traffic from the park area to the coast is urged as a necessity in case of fire in this area. Country presents heavy construction difficulties. Minimum standards of grading and rock surfacing.

145. Boulder Creek to Redwood Park Road. Length 15.5 miles.

This is a connection from Boulder Creek in Santa Cruz County up San Lorenzo Creek to the Redwood Park road near Saratoga Gap. It would be a link in a route for through traffic from San Francisco to Santa Cruz via the Skyline boulevard, shortening the distance by some ten miles over the present Park road. A part of it is an existing county road but construction cost would be high because of difficult country and the need for high standards of alignment and surfacing.

146. Felton east to San Jose-Santa Cruz State highway. Length 3.8 miles.

This route would serve as a cut-off from the San Jose-Santa Cruz road, from a point northeasterly from Santa Cruz, and would lead directly towards the Big Basin. There is a county road existing. Country is difficult for highway construction. High standards of grading and paving would be required.

147. Burke Sanitarium to Calistoga. Length 16.5 miles.

This road would connect from the state highway north of Santa Rosa to Calistoga, Napa County. Country difficult for highway construction. Minimum standards of grading and rock surfacing.

148. Woodwardia to Bodfish Road. Length 23.5 miles.

This road would be an extension of the Skyline boulevard, state highway, and would connect with the county road extending from Gilroy westerly to Monterey Bay, by way of Bodfish Canyon. Country presents construction difficulties. High standards of grading and paving would be required.

149. Bodfish Road (Watsonville to Gilroy Road). Length 21.5 miles.

This route would afford another connection from Watsonville and the coast across the Santa Cruz Mountains to the state highway running south from San Jose through Gilroy. It would also connect with the extension of the Skyline boulevard south from Woodwardia. In the valley near Watsonville, it would traverse existing county road. Difficult mountain location and expensive grading construction with rock surfacing required.

150. Soquel to Woodwardia. Length 15.4 miles.

This road would furnish a means of traveling from the Skyline boulevard near Woodwardia down to Soquel on the Monterey Bay south of Santa Cruz. Grading construction heavy. Minimum standards of grading and rock surfacing.

151. From 5 miles N. W. of Watsonville to 5 miles south of Woodwardia. Length 18 miles.

This road would furnish another means of taking travel from the Skyline boulevard to a point south of Soquel on Monterey Bay. The country is rough. Minimum standards of grading and rock surfacing.

152. Madera to Wawona. Length 61.8 miles.

This road would extend from Madera, Madera County, to Wawona and the Wawona entrance to the Yosemite National Park. County roads exist. After leaving the valley, length about 20 miles, the country is difficult for highway construction, and on the upper end the line would ascend to an elevation of 5000 feet. Much mountainous construction. Minimum standards of grading and rock surfacing.

153. Fresno to Oakhurst. Length 68 miles.

This road would connect with the Madera-Wawona road—the same remarks apply.

154. Fresno to Inyo County Line (Piute Pass). Length 113 miles.

This road is planned to utilize Piute Pass at an elevation of about 11,000 feet as a trans-Sierra road. The section of road lying in the valley in Fresno County is well graded and paved. The mountainous territory presents difficulties for highway construction. Use would be made of power company's existing roads. Minimum standards of grading and disintegrated granite surfacing.

(Numbers 155 to 200 not used.)

201. Bishop to the State Line. Length 43 miles.

This route is known as the Montgomery Pass, and leads from Bishop to the state line in the direction of Tonopah in Nevada. Construction conditions are not difficult. The road lies in a desert valley, with gradual ascending grades to an elevation of 7500 feet near the state line. Minimum standards of grading and rock surfacing would be required.

202. Bishop to the Inyo County line. Length 26 miles.

This is the portion of the Piute Pass route lying in Inyo County. Narrow and steep existing county roads for a portion of the distance. The Piute Pass crosses the Sierras at an elevation of about 11,000 feet. Construction would be heavy. Use of the road would be limited to the summer months, largely for recreational purposes. (See route 154.)

203. Ukiah to Boonville. Length 22.4 miles.

This route would furnish a direct connection from Ukiah road in Mendocino County to Boonville on the McDonnells to Navarro road, at present in the highway system. The country is difficult for highway construction. Minimum standards of grading and rock surfacing.

204. Lone Pine to Camp Nelson. Length 85 miles.

This route would extend from Lone Pine in Inyo County westerly across the Sierras to Camp Nelson, which is already reached by a highway from the valley in Tulare County. Use recreational. Conditions in the mountainous section are difficult for highway construction.

205. Goshen to Tulare. Length 9 miles.

This route lies over existing county paved road in Tulare County, and is the long side of a triangle formed by the state highway extending from Goshen easterly to Visalia, thence south to Tulare. It parallels the Southern Pacific Railroad. It would shorten the length of state highway by several miles, which however, is already constructed. Construction conditions are not difficult. The road would in the future require widening and resurfacing.

206. Cholame to Corcoran. Length 60 miles.

This route would serve as a direct connection from Kings County to the Cholame Pass entrance to San Luis Obispo County. The country is generally flat, and construction conditions are not difficult, except that through remote location there are long hauls for construction materials. Good standards of grading and surfacing would be required.

207. Cray to the Oregon line. Length 23.6 miles.

This route would furnish an additional connection to the Oregon line on a road leading towards Klamath Falls, by way of the Klamath River, and passes through a country devoted to agriculture and lumbering, over an existing county road requiring relocation through fairly heavy construction country.

208. Ventura north to the Cuyama Route (Santa Maria to Bakersfield). Length 68 miles.

This road would furnish a new route from Maricopa and the oil fields in Kern County to Ventura. It reaches an elevation of about 5300 feet. In the valley portions of Ventura County, the county road is now paved. On the balance of the distance to the Cuyama Valley, there is no existing road. Minimum standard of grading with rock surfacing would be required.

209. Lebec south to connection with Los Angeles-Ventura road. Length 62 miles.

This route might be considered an alternate to the Ridge Route from the San Joaquin Valley to Los Angeles and deep water ports, adding considerable distance however and encountering extremely difficult construction conditions for a high class standard of grading and surfacing.

210. Castaic to German. Length 26.5 miles.

This route is proposed as an alternate and parallel substitute for 33 miles of the existing Ridge road. It would shorten the Ridge route by 6.5 miles, and would eliminate several summits on the existing road. The highest elevation is 3600 feet at German, where the road would enter the drainage of Alamo Creek. Construction conditions are difficult. High class grading, alignment and paving would be required.

211. Doyle to Purdy. Length 17.5 miles.

This road would be a continuation of the present state highway route from Susanville to Doyle in a southerly direction to connect with the Nevada state highway near Purdy. The country is not difficult for construction, and minimum standards of grading and rock surfacing would be required.

212. Riverside to San Diego. Length 112.3 miles.

This route would furnish a direct connection from Riverside and San Bernardino County points to San Diego. All paved by Riverside and San Diego counties. No great amount of construction would be required, except through maintenance and reconstruction for widening and surfacing of existing pavements.

213. Red Bluff to Peanut. Length 59.4 miles.

This route is to be considered together with routes No. 111 and No. 226, making a total of 126.4 miles. The combination of the three would furnish a connection from Douglas City, by way of Hayfork to an east and west lateral running from Red Bluff and the Sacramento Valley to Alton on the Coast state highway in Humboldt County. The country traversed for the most part is rugged, considerable cross drainage is encountered. Little population or settlement. Grading and surfacing work on minimum standards would be required. The route would parallel the Redding-Arcata route already in the highway system, and would include the section from Peanut to Kuntz, 30 miles in length, one of the first roads made a state highway by legislative action.

214. Calexico to Alamo School. Length 20 miles.

This route in Imperial County would furnish a connection from Calexico to the route between Holtville and Yuma. Construction conditions are not difficult, except for long haul on building materials. High standards of grading and paving.

215. Santa Monica to Saugus. Length 30 miles.

This route, lying in Los Angeles County, is designed to furnish a direct connection, avoid heavy traffic congestion on present roads from Santa Monica to Saugus, at the south end of the present Ridge route. Topographical and right of way difficulties are encountered. High type of grading and paving.

216. Santa Ana to San Bernardino. Length 34 miles.

217. Newport Beach to Santa Ana. Length 6 miles.

Over existing county pavements in Orange, Riverside and San Bernardino counties, this route would furnish a direct connection from the Coast state highway at Newport to San Bernardino. Practically all of this road is already paved. Maintenance and reconstruction would be necessary in the future. High standards of grading and paving.

218. Santa Ana to Los Angeles. Length 27 miles.

This route would parallel the existing state highway between Santa Ana and the southeasterly city limits of Los Angeles. Physical topographical conditions are not difficult for construction. Right of way would be very expensive and difficult to obtain. Highest standards of paved street construction and several expensive bridges would be required.

219. Arrowhead Trail (Silver Lake Cut-off). Length 125 miles.

This route is designed to furnish direct and short connection from Barstow, California, to Las Vegas, Nevada. The federal aid authorities are urging the inclusion of this road as a necessary link in the federal aid route from Salt Lake City, Utah, to Los Angeles. The state of Nevada is also urging its inclusion in the California highway system. Country desert, much sand, little water, some available deposits of native rock and gravel. Maximum elevation 4500 feet. Topographical conditions not difficult for good location and construction. Minimum standards of grading and rock surfacing.

220. Pomona to Los Angeles. Length 25 miles.

This route would make a direct connection from existing state highway to Riverside, to Los Angeles. Would lie for the most part along the route of the present Valley boulevard in Los Angeles County, already paved. New construction and better alignment to avoid railroad crossings would be necessary. Right of way conditions are difficult. Construction conditions are not heavy. Highest type of grading and paving would be required.

221. Long Beach to Pasadena. Length 30.5 miles.

This route would lie over existing county pavements. Some additional construction for the improving of alignment would be necessary. Construction conditions are not difficult. Right of way would be expensive and difficult to obtain. Highest standards of grading and paving would be required.

222. Sunland to San Fernando Boulevard. Length 4.5 miles.

This route is a connection from state highway route 9 at Sunland to San Fernando boulevard, over an existing county road. It serves as an intermediary connection between these two routes. Holiday traffic is large and high standards are required for construction.

223. Cascades to San Fernando. Length 5.5 miles.

This route is proposed to extend from a point on the present highway northwest of San Fernando to the present state highway between San Fernando and Pasadena. It is intended to avoid the heavy traffic in San Fernando and on the portion of the existing state highway from San Fernando to the Newhall tunnel, and would facilitate traffic between Newhall and the foothill boulevard to San Bernardino. Construction conditions are difficult. Highest type of grading and paving would be required.

224. Pasadena Cut-off. Length 12 miles.

This route is proposed as a route to avoid the city street traffic of Pasadena and would lie to the north of the present state highway. Heavy construction. Right of way would be difficult and expensive to obtain. Highest type of grading and paving would be required.

225. General Grant National Park to Sequoia National Park. Length 10 miles.

This route is proposed to connect the two national parks. Road would lie in the high Sierras and construction would be difficult. Minimum standards of grading and rock or disintegrated surfacing would be required.

226. Peanut to Douglas City. Length 27 miles.

(See description under No. 213.)

227. Big Bear Lake to Mentone. Length 48.8 miles.

This route would furnish an additional means of reaching the recreational areas in the

San Bernardino mountains, from the town of San Bernardino. The elevation at Big Bear Lake is 7000 feet and at San Bernardino about 1500 feet. Construction features would be difficult. Minimum standards of grading and rock surfacing would be required.

228. Yreka east to Modoc County to connect with Susanville to the Oregon Line (See route No. 229 below). Length 77.9 miles.

This route would serve to develop the northeastern part of Siskiyou County, passing through Little Shasta and Tecnor, and afford an additional cross connection from the main trunk line to the western portion of Modoc County. Traffic would be of local character and a rock surfaced road would satisfy the requirements.

229. Susanville to Oregon Line, via Bieber. Length 133.7 miles.

This route is designed to connect with the Oregon state highway system leading to Crater Lake and Klamath Falls, and is also a direct route from that locality to Lassen National Park. It would be a part of a through road lying east of the Sierra Nevada Mountains from Klamath Falls to Reno. Construction problems are not classed as difficult. Ultimate traffic would most probably be heavy and would require good standards of alignment and construction.

230. Willows to the Coast State highway in Mendocino County. Length 100 miles.

This route would furnish another lateral connection between the Sacramento Valley and the coast, passing through Glenn and Mendocino counties by way of Covelo and Round Valley. Construction is expensive. Mountanious country. Minimum standard grading and rock surfacing.

231. Downieville east to junction with Doyle-Purdy road. Length 65 miles.

This route is the well known Yuba Pass, one of the most favorable passes in the northern part of the state over the Sierra Nevada Mountains. Forest highway project has been under way on this road for several years. Country heavy mountanious. Minimum standards of grading and rock surfacing.

APPENDIX J

Taxes on Motor Vehicle Operation for All States

IN FORCE FEBRUARY 20, 1925

TAXES ON MOTOR VEHICLE OPERATION FOR ALL STATES IN FORCE FEBRUARY 20, 1925

State	Taxed as Personal Property	REGISTRATION TAXES					Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars			
		Horsepower.		*Tons Capacity.*			
Alabama	Yes	Under 25 h.p.	$11 25	Under 1 ton	$15 00		2¢
		25 h.p. to less than 30 h.p.	18 75	1 to less than 2 tons	22 50		
		30 h.p. to less than 40 h.p.	26 25	2 to less than 3 tons	50 00		
		40 h.p. or over	30 00	3 to less than 4 tons	100 00		
				4 to less than 5 tons	200 00		
				5 to less than 6 tons	400 00		
				6 to less than 7 tons	750 00		
				7 tons or over	1,000 00		
		Steam Propelled.		*Tractors.*			
		Flat rate	$25 00	*Flat Rate.*			
				Each	$100 00		
		Electrically Driven.		(Except where used on farm.)			
		Flat rate	$20 00				
		(Other than trucks.)					
		Horsepower.		*Tons Capacity.*			
Arizona	Yes	25 or less	$5 00	1½ tons or less	$10 00		3¢
		Over 25 through 40	10 00	Over 1½ through 3 tons	15 00		
		Over 40	15 00	Over 3 tons	25 00		
		Horsepower and Lbs. Gross Weight.		*Tons Capacity.* (Pneumatic Tires)			
				1 ton or less	$25 00		4¢
Arkansas	Yes	12½¢ per h.p. and 55¢ per 100 lbs. gross wt. of vehicle and load. (Equipped with pneumatic tires.)		1½ tons	35 00		Oil
				2 tons	60 00		10¢
				2½ tons	90 00		
				3 tons	125 00		
		Minimum fee	$15 00	3½ tons	150 00		
				4 tons	175 00		
				4½ tons	225 00		
				5 tons	300 00		
				6 tons	400 00		
				Equipped with Two or More Solid Tires.			
				One and one-half times the above schedule, except for trucks of 1 ton or less capacity.			
				Minimum fee	$15 00		
		Flat Rate		*Flat Rate plus Lbs. Weight.*			
California	Yes	$3.00 per car		Flat rate	$3 00		2¢
		Steam Propelled		plus following fees:			
		Flat rate	$3 00	*Weight Unladen*	*Pneu.*	*Solid*	
				Less than 3,000 lbs.	$5 00	$10 00	
		Electrically Driven.		3,000 to 5,999 lbs.	10 00	20 00	
		Flat rate	$13 00	6,000 to 9,999 lbs.	15 00	30 00	
				10,000 lbs. or over	20 00	40 00	
				Electrically Driven			
				In addition to above fees, must pay a flat charge of $50 to offset gasoline tax.			
		Cost Price.		*Tons Capacity.*			
Colorado	Yes	½ of 1% of original cost price F. O. B. factory. 30% reduction after 5th year; 50 % reduction after 8th year.		1 ton	$10 00		2¢
				Over 1 to 2 tons	17 50		
				Over 2 to 3 tons	25 00		
				Over 3 to 4 tons	37 50		
		Minimum fee	$5 00	Over 4 to 5 tons	50 00		
				Each additional ton over 5	25 00		

State	Taxed as Personal Property	REGISTRATION TAXES					Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars			
		Cubic Inch Displacement.		*Tons Capacity.*			
Connecticut	Yes	Per cu. in. of displacement	$0 08		*Pneu.*	*Solid*	
		Minimum fee	15 00	½ ton or less	$15 00	$30 00	1¢
				1 ton	22 50	30 00	
		Steam Propelled.		1½ tons	30 00	40 00	
		Per horsepower	$0 75	2 tons	37 50	50 00	
		Minimum fee	15 00	2½ tons	60 00		
				3 tons	70 00		
		Electrically Driven.		3½ tons	90 00		
		Per horsepower	$0 75	4 tons	137 50		
		Minimum fee	5 00	4½ tons	162 50		
				5 tons	187 50		
				5½ tons	218 75		
				6 tons	250 00		
				6½ tons	350 00		
				7 tons	350 00		
				Same fee for solid tire trucks of 2½ to 7 tons capacity.			
				Tractors.			
				Flat Rate.			
				$30.00 per year.			
		Lbs. Gross Weight.		*Lbs. Gross Weight.*			
Delaware	X	Per 500 lbs.	$2 00	Per 500 lbs.	$2 00		2¢
		Measured by sum of weight of vehicle plus seating capacity times 125 lbs.		Measured by maximum load capacity plus weight of vehicle.			
		Lbs. Gross Weight.		*Lbs. Gross Weight.*			
Florida	Yes	Per 100 lbs.	$0 50	Per 100 lbs. (pneumatic)	$0 75		3¢
				Per 100 lbs. (solid)	1.12		
				Airless cushion tires on 1-ton trucks, 20% more than for pneumatics.			
				Airless cushion on over 1-ton trucks, same as solids.			
		Horsepower.		*Tons Capacity.*			
Georgia	Yes	23 h.p. or less	$11 25	1 ton or less	$15 00		3¢
			Per h.p.	Over 1 to 1½ tons	22 50		
				Over 1½ to 2 tons	30 00		
		Over 23 h.p.	$0 60	Over 2 to 2½ tons	37 50		
				Over 2½ to 3 tons	45 00		
		Electrically Driven.		Over 3 to 3½ tons	52 50		
		Flat rate	$11 25	Over 3½ to 4 tons	75 00		
				Over 4½ to 5 tons	150 00		
				Over 5 to 6 tons	375 00		
				Over 6 to 7 tons	750 00		
				Over 7 tons	1,125 00		
		Lbs. Gross Weight.		*Tons Capacity.*			
Idaho	X	2,000 lbs. or less	$15 00		*Pneu.*	*Solid*	
		Over 2,000 to 3,000 lbs.	20 00	1 ton or less	$22 50	$30 00	2¢
		Over 3,000 to 4,000 lbs.	30 00	Over 1 to 1½	30 00	40 00	
		Over 4,000 to 4,500 lbs.	40 00	Over 1½ to 2	40 00	50 00	
		Over 4,500 to 5,000 lbs.	45 00	Over 2 to 2½	50 00	65 00	
		Over 5,000 to 6,000 lbs.	55 00	Over 2½ to 3	65 00	75 00	
		Over 6,000 lbs.	60 00	Over 3 to 3½	75 00	85 00	
				Over 3½ to 4	85 00	100 00	
				Over 4 to 4½	95 00	120 00	
				Over 4½ to 5	110 00	140 00	
				Over 5 tons, $50.00 each additional ton. (Special permit to operate.)			
				Metal Tires.			
				1 ton or less	$60 00		
				Over 1 to 1½	80 00		
				Over 1½ to 2	100 00		

State	Taxed as Personal Property	REGISTRATION TAXES					Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars			
		Horsepower.		*Lbs. Gross Weight.*			
Illinois	Yes	25 h.p. or less	$8 00	5,000 lbs. or less	$12 00		X
		Over 25 to 35	12 00	Over 5,000 to 12,000 lbs.	22 50		
		Over 35 to 50	20 00	Over 12,000 to 16,000 lbs.	75 00		
		Over 50	25 00	Over 16,000 to 20,000 lbs.	100 00		
				Over 20,000 lbs.	150 00		
		Electrically Driven.					
		Flat rate	$12 00				
		Horsepower.		*Tons Capacity.*			
Indiana	Yes	Less than 25 h.p.	$5 00	Less than 1 ton	$6 00		2¢
		25 h.p. and less than 40	8 00	1 ton and less than 2	15 00		
		40 h.p. and less than 50	20 00	2 tons and less than 3½	25 00		
		50 h.p. or more	30 00	3½ tons and less than 5	50 00		
				5 tons and not over 7½	75 00		
		Steam Propelled.					
		Same as gas cars.					
		Electrically Driven.					
		Flat rate	$5 00				
		Value plus Lbs. Gross Weight.		*Tons Capacity.*	*Pneu.*	*Solid*	
Iowa	X	1% of value plus 40¢ per 100 lbs. or fraction thereof.		1 ton or less	$15 00	$15 00	X
		Minimum annual fee, $10.00.		Over 1 to 1½	22 50	22 50	
		(Executive Council annually fixes basing value and weight for computing fees.)		Over 1½ to 2	30 00	30 00	
				Over 2 to 2½	45 00	55 00	
				Over 2½ to 3	65 00	75 00	
				Over 3 to 3½	90 00	100 00	
		Electrically Driven.		Over 3½ to 4	105 00	115 00	
		Same as gas cars.		Over 4 to 4½	120 00	130 00	
				Over 4½ to 5	135 00	145 00	
				Over 5 to 6	165 00	175 00	
				Trucks over 2 tons in city limits pay two-thirds of regular fee.			
				Steel Tires.			
				1 ton	$40 00		
				Over 1 to 1½	50 00		
		Flat Rate plus Lbs. Weight.		*Tons Capacity.*			
Kansas	Yes	Flat rate	$8 00	1 ton or less	$15 00		X
		Over 2,000 lbs. per each 100 lbs.	50	Over 1 to 1½ tons	22 50		
				Over 1½ to 2 tons	30 00		
		Electrically Driven.		Over 2 to 2½ tons	37 50		
		Flat rate	$10 00	Over 2½ to 3 tons	45 00		
				Over 3 to 4 tons	70 00		
				Over 4 to 5 tons	100 00		
				Over 5 tons	100 00		
				Plus $25.00 per ton or fraction thereof over 5 tons.			
		Horsepower plus Gross Weight.		*Lbs. Capacity.*			
Kentucky	Yes	Per h.p.	$0 25	1,000 lbs. or less	$20 00		3¢
		Plus each 100 lbs. gross weight	40	Over 1,000 to 2,000 lbs.	30 00		
				Over 2,000 to 3,000 lbs.	55 00		
		Electrically Driven.		Over 3,000 to 4,000 lbs.	70 00		
		Same as gas cars.		Over 4,000 to 5,000 lbs.	85 00		
				Over 5,000 to 6,000 lbs.	95 00		
				Over 6,000 to 7,000 lbs.	125 00		
				Over 7,000 to 8,000 lbs.	150 00		
				Over 8,000 to 9,000 lbs.	185 00		
				Over 9,000 to 10,000 lbs.	215 00		
				Over 10,000 lbs.	215 00		
				Plus $20.00 for each additional ton over 5 tons.			

State	Taxed as Personal Property	REGISTRATION TAXES				Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars		
		Horsepower.		*Horse Power plus Tons Capacity.*		
Louisiana	Yes	Per h.p.	$0 68	Per h.p.	68¢ plus	2¢
		Minimum fee	15 00	*Tons Capacity*		
				4,000 lbs. or less	$10 00	
				4,001 to 5,000 lbs.	12 50	
				5,001 to 6,000 lbs.	15 00	
				6,001 to 8,000 lbs.	20 00	
				8,001 to 10,000 lbs.	25 00	
				$150.00 per 1,000 lbs. in excess of 10,000 lbs. capacity, except where such vehicle operates in city of over 10,000 population.		
				Minimum fee	$25 00	
		Horsepower plus Lbs. Weight.		*Lbs. Capacity.*		
Maine	Yes	Per h.p.	$0 25	*Pneumatics.*		
		Per 100 lbs. (pneumatic)	25	1,000 lbs. or less	$10 00	1¢
		Per 100 lbs. (solid)	50	Over 1,000 to 2,000 lbs.	15 00	
		Minimum fee	10 00	Over 2,000 to 4,000 lbs.	20 00	
				Over 4,000 to 6,000 lbs.	55 00	
		Steam Propelled.		Over 6,000 to 8,000 lbs.	80 00	
		H.P. rating based on the system of rating adopted by the United States Government.		Over 8,000 lbs.	110 00	
				If equipped with 2 or more solid tires 33⅓% more.		
		Electrically Driven.		*Tractors.*		
		Rating to be normal h.p. rating designated by the manufacturers of the electric motors or motor in vehicle, plus lbs. weight.		*Horse Power plus Lbs. Weight.*		
				Pneumatics.		
				Per h.p.	$0 25	
				Plus each 100 lbs.	25	
				Solid.		
				Per h.p.	$0 25	
				Plus each 100 lbs.	50	
				Metal.		
				Per h.p.	$0 25	
				Plus each 100 lbs.	80	
		Horsepower.		*Lbs. Carrying Capacity.*		
Maryland	Yes	Per h.p.	$0 32	*Gasoline Propelled.*		
				Equipped with pneumatic tires same rate as for passenger cars.		2¢
				Equipped with solid tires as follows:		
				2,000 lbs. or less	$10 00	
				Over 2,000 to 3,000 lbs.	15 00	
				Over 3,000 to 4,000 lbs.	20 00	
				Over 4,000 to 5,000 lbs.	25 00	
				Over 5,000 to 6,000 lbs.	30 00	
				Over 6,000 to 7,000 lbs.	40 00	
				Over 7,000 to 8,000 lbs.	50 00	
				Over 8,000 to 9,000 lbs.	62 50	
				Over 9,000 to 10,000 lbs.	75 00	
				Over 10,000 to 12,000 lbs.	300 00	
				Over 12,000 to 14,000 lbs.	500 00	
				Electrically Driven.		
				Equipped with solid tires up to 10,000 lbs. capacity, double the fee for gasoline propelled.		
				Tractors.		
				Flat rate	$25 00	

State	Taxed as Personal Property	REGISTRATION TAXES		Gasoline Tax Per Gallon
		Passenger Cars	Commercial Cars	
Massachusetts	Yes	*Horsepower.* Less than 30 h.p. $10 00 30 to 39 h.p. 15 00 40 to 49 h.p. 20 00 50 h.p. and over 25 00	*Tons Capacity.* 1 ton or less $10 00 Over 1 to 2 tons 20 00 Over 2 to 3 tons 30 00 Over 3 to 4 tons 40 00 Over 4 to 5 tons 50 00 For each additional ton or fraction thereof over 5 tons, $10.00. *Electrically Driven.* One-half of regular truck fees. *Tractors.* Flat rate $10 00	X
Michigan	X	*Horsepower plus Lbs. Weight.* Per h.p. $0 25 Plus each 100 lbs. 35 *Steam Propelled.* Same as for gasoline cars. *Electrically Driven.* Per h.p. $1 00 Plus each 100 lbs. 35	*Horsepower plus Lbs. Weight.* Same as for passenger cars. *Tractors.* Same as for commercial cars if operated on highways.	2¢
Minnesota	X	*Value plus Lbs. Weight.* 2¾ % of value. Minimum fee for vehicles weighing less than 2,000 lbs. $12 00 Weighing over 2,000 lbs. 15 00 10% depreciation allowed for each year after first year, up to and including seventh year. 70% allowed for eighth year and each subsequent year. *Electrically Driven.* Same as above.	*Value plus Tons Capacity.* 2¾% of value. *Minimum fee* 1 ton or less $15 00 Over 1 under 2 tons 20 00 2 tons up to 3 tons 30 00 3 tons up to 4 tons 60 00 4 tons up to 5 tons 85 00 5 tons up to 6 tons 125 00 6 tons or over 150 00 *Electrically Driven.* Same as above. *Tractors.* Same as commercial cars. Same depreciation as allowed passenger cars.	X
Mississippi	Yes	*Horsepower plus Gross Weight.* Per h.p. $0 10 Per 100 lbs. 40 Gross weight of car as shown by manufacturer's rating. Minimum fee $10 00 *Electrically Driven.* Flat rate $15 00	*Tons Capacity* Equipped with pneumatic tires. 1 ton or less $10 00 1½ tons 20 00 2 tons 40 00 2½ tons 50 00 3 tons 82 50 3½ tons 112 50 4 tons 172 50 4½ tons 225 00 5 tons 300 00 6 tons 400 00 School trucks (used exclusively as such) 10 00 Equipped with two or more cushions or semi-pneumatic tires: One and one-quarter times above schedule. (This increased rate does not apply on trucks of one ton or less capacity.) Equipped with two or more solid tires: One and one-half times above schedule. (This increased rate does not apply to trucks of 1½ tons or less capacity.)	3¢

State	Taxed as Personal Property	REGISTRATION TAXES				Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars		
		Horsepower.		*Tons Capacity.*		
Missouri	Yes	Less than 12 h.p.	$7 50	Less than 2 tons	$10 50	2¢
		12 under 24 h.p.	10 50	2 less than 5 tons	18 00	
		24 under 36 h.p.	16 50	5 less than 6 tons	27 00	
		36 under 48 h.p.	22 50	6 less than 7 tons	30 00	
		48 under 60 h.p.	25 50	7 less than 8 tons	36 00	
		60 under 72 h.p.	31 50	Over 8, per ton extra	15 00	
		72 and over	37 50	Municipalities may levy fees up to ⅓ of State fees.		
		Steam Propelled.				
		Flat rate	$7 00			
		Electrically Driven.				
		Flat rate	$7 00			
		Municipalities may levy fees up to ⅓ of State fees.				
		Horsepower.		*Tons Capacity.*		
Montana	Yes	23 or less	$7 50	1 or less tons	$10 00	2¢
		Over 23 to 37 h.p.	15 00	Over 1 up to 2 tons	22 50	
		Over 37 h.p.	22 50	Over 2 to 3 tons	37 50	
		Electrically Driven.		Over 3 to 5 tons	60 00	
		Flat rate	$15 00	Over 5 tons	200 00	
		Lbs. Gross Weight.		*Lbs. Gross Weight.*		
Nebraska	Yes	2,000 lbs. or less	$10 00	2,000 lbs.	$10 00	X
		Per 100 lbs. over 2,000 lbs.	50	Per 100 lbs. over 2,000 lbs.	50	
		Gross weight taken when seating capacity exceeds 7.		Two wheel truck weighing less than 1,000 lbs.	5 00	
		(Passengers reckoned at 150 lbs. each.)				
		Lbs. Gross Weight plus Capacity.		*Lbs. Gross Weight.*		
Nevada	Yes	Per 100 lbs.	$0 35	Per 100 lbs.	$0 35	2¢
		Factory advertised weight plus seating capacity times 125 lbs. per person.				
		Steam Propelled.				
		Same as for commercial cars.				
		Lbs. Gross Weight Pneumatic Tires.		*Lbs. Gross Weight.* *Solid Tires.*		
New Hampshire	X	Up to 4,000 lbs., 45¢ per 100 lbs. of total.		Up to 4,000 lbs., 65c per 100 lbs. of total.		2¢
		4,001 to 6,000 lbs., 55¢ per 100 lbs. of total.		4,001 to 6,000 lbs., 75¢ per 100 lbs. of total.		
		6,001 to 8,000 lbs., 60¢ per 100 lbs. of total.		6,001 to 8,000 lbs., 80¢ per 100 lbs. of total.		
		Over 8,000 lbs., 70¢ per 100 lbs. of total.		Over 8,000 lbs., 90¢ per 100 lbs. of total.		
		Minimum fee, $10.00, up to and including 2,200 lbs.		Minimum fee, $15.00, up to and including 2,300 lbs.		
		Passengers figured at 150 lbs. each, times seating capacity.				
				Equipped with Pneumatic Tires.		
				Same rate as passenger cars.		
				Equipped with Iron or Steel Tires.		
				20c per 100 lbs. in addition to solid tire rates.		
		Horsepower.		*Lbs. Gross Weight.*		
New Jersey	Yes	29 h.p. or less	$0 40	1,000 lbs. or less	$10 00	X
		Over 29	50	1,001 to 2,000 lbs.	12 00	
				2,001 to 3,000 lbs.	15 00	
				3,001 to 4,000 lbs.	20 00	
				4,001 to 5,000 lbs.	24 00	
				Per 1,000 lbs. over 5,000 lbs. up to 30,000 lbs. gross	3 00	
				Tractors.		
				Same as commercial cars.		

State	Taxed as Personal Property	REGISTRATION TAXES		Gasoline Tax Per Gallon
		Passenger Cars	Commercial Cars	
New Mexico	Yes	*Horsepower.* Per h.p. $0 40 (Formula of National Automobile Chamber of Commerce.) *Steam Propelled.* Same as above. (Formula adopted by U. S. Government.) *Electrically Driven.* Capacity for 2 persons $12 00 More than 2 persons 25 00	*Flat Rate plus Carrying Capacity.* Over 3,000 lbs. carrying capacity equipped with pneumatic tires, $15.00. Plus 50c for each 100 lbs. of carrying capacity over 3,000 lbs. Trucks having any solid tires of rubber or other material, 25% additional charged.	1¢
New York	X	*Lbs. Weight.* 3,500 lbs. or less, 50¢ per 100 lbs. 75¢ for each 100 lbs. over 3,500 lbs. Minimum Fee: Less than 6 cyl. $8 00 6 cyl. or more 10 00 *Electrically Driven.* Flat rate $10 00	*Tons Gross Weight.* Light delivery vehicles, equipped for both commercial and passenger purposes weighing less than 1,800 lbs. unladen $12 00 Vehicles with gross weight of 2 tons, and not less than 1,800 lbs. unladen 16 00 Vehicles with gross weight of more than 2 tons, $8.00 for each ton or fraction thereof.	X
North Carolina	Yes	*Horsepower.* 24 h.p. or less $12 50 Over 24 to 30 h.p. 20 00 Over 30 to 35 h.p. 30 00 Over 35 h.p. 40 00 *Steam Propelled.* Same as above. *Electrically Driven.* Same as above.	*Tons Capacity.* Less than ½ ton $12 50 Over ½ up to 1 ton 15 00 Over 1 up to 2 tons 25 00 Over 2 up to 3 tons 75 00 Over 3 up to 4 tons 200 00 Over 4 tons 300 00 *Electrically Driven.* Same as above.	3¢
North Dakota	X	*Factory Selling Price Net Weight and H. P.* *First Registration* Per $1.00 value $0 005 Per each 100 lbs. 20 Per each h.p. 10 *Second Registration.* 10% reduction. *Third Registration.* 25% reduction *All Other Registration* 40% reduction. Minimum fee in all cases $5 00 *Electrically Driven.* $2.00 in lieu of horse power fee.	*Factory Price, Net Weight, plus Horse Power.* Same basis as for passenger cars plus the following rates per ton capacity: *Per ton* 1 ton up to 3 tons $3 00 3 tons up to 4 tons 5 00 Over 4 tons 10 00	1¢
Ohio	Yes	*Horse Power.* 25 h.p. or less $8 00 Over 25 to 35 h.p. 12 00 Over 35 h.p. 20 00 *Steam Propelled.* Same as above. H.P. rating system same as adopted by U. S. Government. *Electrically Driven.* Flat rate $8 00	*Horse Power plus Weight of Vehicle and Load.* Less than 25 h.p. $8 00 Plus 20c per 100 lbs. or fractional part thereof. 25 h.p. to 30 h.p. 12 00 Plus 30¢ per 100 lbs. or fractional part thereof. Over 30 h.p. 20 00 Plus 80c per 100 lbs. or fractional part thereof. *Tractors.* Special registration.	X

State	Taxed as Personal Property	REGISTRATION TAXES		Gasoline Tax Per Gallon
		Passenger Cars	Commercial Cars	
Oklahoma ----------	X	*Value.* First $500 value---------------$10 00 Over $500 value, 75¢ per $100 in excess of $500. Reduction of 20% each year for 3 years on vehicles which have been licensed for two successive years. Minimum fee ---------------$10 00	*Lbs. Capacity.* 1,500 lbs. or less------------$15 00 1,500 to 2,000-------------- 20 00 Over 2,000 to 3,000--------- 25 00 Over 3,000 to 4,000--------- 40 00 Over 4,000 to 6,000--------- 60 00 Over 6,000 to 8,000---------100 00 Over 8,000 ----------------300 00 Reduction of 20% each year for 3 years on vehicles, except those of 5 tons or more capacity, which have been licensed for 2 years. Minimum fee-------------- 10 00 *Tractors.* *Horse Power.* *Regular Rate.* First year-------------50¢ per h.p. 10% reduction each subsequent registration. Minimum fee----------20¢ per h.p. *Proratum Rate.* Jan. 1 to April 1, 50¢ per h.p. April 1 to July 1, 37½¢ per h.p. July 1 to October 2, 25¢ per h.p. October 1 to January 1, 12½¢ per h.p.	2½¢
Oregon -------------	X	*Lbs. Weight.* Graduated scale ranging from $15.00 for cars weighing 1,700 lbs. or less, to $97.00 for cars weighing over 5,700 lbs.	*Total Tire Width.* Trucks with one or more solid tires, graduated scale, based on total tire width ranging from $35.00 for total tire width of 14 inches or less to $140.00 for total tire width of 40 inches. Trucks with four pneumatic tires, graduated scale, based on total tire width ranging from $35.00 for total tire width of 20 inches or less to $70.00 for total tire width of 40 inches.	3¢
Pennsylvania --------	X	*Horsepower.* Per h.p. or fractional part thereof --------------------- $0 40 Minimum fee----------------- 10 00	*Lbs. Chassis Weight.* *Weight* — *Pneu. Tire* — *Solid Tire* Under 2,000 lbs----$15 00 $18 75 2,000 less than 3,000 24 00 30 00 3,000 less than 4,000 32 00 40 00 4,000 less than 5,000 40 00 50 00 5,000 less than 6,000 56 00 70 00 6,000 less than 7,500 80 00 100 00 7,500 less than 9,000 100 00 125 00 9,000 and over-----140 00 200 00 *Electrically Driven.* *Gross Max. Weight* — *Fee* 5,000 lbs or less-------------$15 00 5,001 to 7,000 lbs--------- 24 00 7,001 to 11,000 lbs.-------- 32 00 11,001 to 15,000 lbs.-------- 40 00 15,001 to 18,000 lbs.-------- 56 00 18,001 to 22,000 lbs.-------- 80 00 22,001 to 25,000 lbs.--------100 00 25,001 to 26,000 lbs.--------140 00 *Tractor Trucks.* Same as for commercial cars. *Equipped with Metal Tires.* Double the regular fee. *Tractors.* *Class* — *Fee* Agricultural -------------- $5 00 Hauling ------------------ 50 00	2¢

DISTRICT LIBRARY

State	Taxed as Personal Property	REGISTRATION TAXES				Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars		
		Horsepower plus Lbs. Gross Weight.		*Horsepower plus Lbs. Gross Weight.*		
Rhode Island	Yes	Per h.p.	$0 25	Same basis as for passenger cars.		X
		Plus per each 100 lbs. (Pneu.)	25			
		Per 100 lbs. (Solid)	35	*Tractors.*		
		Per 100 lbs. (Metal)	50	Same as for passenger cars.		
		Steam Propelled.				
		H. P. plus gross weight same as passenger cars. U. S. Government system of h.p. rating.				
		Electrically Driven.				
		H. P. plus Gross Weight.				
		Same rate as for passenger cars.				
		Manufacturers' rating on h.p.				
		Lbs. Weight.		*Tons Capacity.*		
South Carolina	Yes	2,000 lbs. or less	$12 00	*Solid Tires*		
		For each additional 500 lbs. or fraction thereof over 2,000 lbs.	6 00	1 ton or less	$30 00	3¢
				Over 1 ton to 2 tons	60 00	
				Over 2 tons to 3 tons	120 00	
				Over 3 tons to 4 tons	200 00	
				Over 4 tons to 5 tons	400 00	
				Over 5 tons to 6 tons	600 00	
				Over 6 tons to 7 and over	800 00	
				No truck having a capacity greater than 4 tons granted license to operate except by consent of authorities having charge of roads over which truck will operate and approval of State Highway Engineer.		
				All Pneumatic Tires.		
				25% lower than for solid tires.		
		Manufacturers' Weight.		*Tons Carrying Capacity.*		
South Dakota	Yes, but only on vehicles not registered prior to May 1st.	Less than 2,000 lbs.	$13 00	Less than 1 ton	$15 00	2¢
		2,000 up to 3,000 lbs.	17 00	1 ton up to 1½	20 00	
		3,000 up to 4,000 lbs.	20 00	1½ tons up to 2	25 00	
		4,000 and over	35 00	2 tons up to 3	35 00	
				3 tons or over	75 00	
		Horse Power.		*Horsepower plus Tons Capacity.*		
Tennessee	Yes	Per h.p.	$0 50	Per h.p.	$0 50	2¢
				Plus the following:		
		Electrically Driven.		½ ton to 2 tons, inclusive	15 00	
		Flat rate	$12 50	2½ tons to 3½ tons, inclusive	20 00	
				4 to 4½ tons, inclusive	30 00	
				5 to 5½ tons, inclusive	40 00	
				6 tons and over	50 00	
				Tractors.		
				Flat rate	$25 00	
				Electrically Driven.		
				Flat rate	$12 50	
				Plus $5.00 per ton capacity.		

State	Taxed as Personal Property	REGISTRATION TAXES							Gasoline Tax Per Gallon
		Passenger Cars			Commercial Cars				
		Horse Power plus Lbs. Weight.			*Horsepower plus Lbs. Gross Weight.*				
			Fees per 100 lbs. or fraction	Per H. P.	*Gross Wt. in Lbs.*	*Per 100 lbs. or Fraction of Gross Wt.* *Pneu.*	*Solid*	*H.P.*	
					6,000 lbs. or less	$0 30	$0 40	17½¢	1¢
Texas	Yes	2,000 lbs or less	40¢	17½¢	Over 6,000 to 8,000	40	50	17½¢	
		Over 2,000 to 3,500 lbs.	50¢	17½¢	Over 8,000 to 10,000	50	60	17½¢	
		Over 3,500 to 4,500 lbs.	60¢	17½¢	Over 10,000 to 12,000	60	80	17½¢	
		Over 4,500 lbs.	75¢	17½¢	Over 12,000 to 14,000	80	1 00	17½¢	
		Minimum fee based on h.p.		$4 00	Over 14,000 to 16,000	1 20	1 50	17½¢	
		Steam Driven.			Over 16,000 to 22,000	1 60	2 00	17½¢	
		Same as above.			Over 22,000	4 00	5 00	17½¢	
		Electrically Driven.			*Tractors.* *Lbs. Weight.*				
		Same as above.				*Per Cwt.*			
					4,000 lbs. or less	$0 25			
					Over 4,000 to 6,000	50			
					Over 6,000 to 8,000	60			
					Over 8,000 to 10,000	75			
					Over 10,000 to 16,000	1 00			
					Over 16,000 to 20,000	2 00			
		Horse Power.			*Tons Capacity.*				
						Pneu.	*Two or More Solid*		
Utah	Yes	25 h.p. or less		$5 00	½ ton or less	$5 00	$5 00		2½¢
		Over 25 to 40		7 50	Up to ¾ ton	7 50	7 50		
		Over 40 to 50		10 00	Up to 1 ton	10 00	20 62½		
		Over 50 h.p.		12 50	Over 1 to 1½ tons	15 00	26 25		
		Steam Propelled.			Over 1½ to 2 tons	22 50	33 75		
		15 h.p. or less		$10 00	Over 2 to 2½ tons	26 35	41 25		
		Over 15 h.p.		15 00	Over 2½ to 3 tons	33 75	48 75		
		Electrically Driven.			Over 3 to 3½ tons	41 25	80 00		
		Flat rate		$15 00	Over 3½ to 4 tons	48 75	100 00		
					Over 4 to 4½ tons	67 50	120 00		
					Over 4½ to 5 tons	67 50	140 00		
					Iron, Steel or Hard Tires.				
					1 ton or less	$40 00			
					1½ tons	60 00			
					2 tons	80 00			
		Lbs. Weight.			*Tons Capacity.*				
Vermont	X	Per 100 lbs.		$0 85	1,500 lbs. to 2,000 lbs.	$20 00			1¢
		Minimum fee		14 00	Over 1 to 1½ tons	30 00			
					Over 1½ to 2 tons	40 00			
					Over 2 to 2½ tons	50 00			
					Over 2½ to 3 tons	75 00			
					Over 3 to 4 tons	100 00			
					Each additional ton or fraction thereof over 4 tons	25 00			
					Tractors				
					Same as commercial cars.				

State	Taxed as Personal Property	REGISTRATION TAXES				Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars		
		Horsepower.		*Tons Capacity.*		
Virginia	Yes	Per h.p.	$0 60	1 ton or less	$15 00	3¢
		Minimum fee	13 20	1 to 1½ tons	20 00	
				2 tons	30 00	
		Steam Propelled.		2½ tons	40 00	
		Same as above.		3 tons	60 00	
				3½ tons	80 00	
		Electrically Driven.		4 tons	110 00	
		Same as above.		4½ tons	150 00	
				5 tons	200 00	
				Tractors.		
				With trailers classed with trucks and shall pay same fees based on tonnage of trailers.		
		Lbs. Weight.		*Lbs. Weight.*		
Washington	Yes	1,500 lbs. or less	$10 00	1,500 lbs. or less	$10 00	2¢
		Plus 60¢ per 100 lbs. in excess of 1,500 lbs.		Per 100 lbs. over 1,500 up to 6,500 lbs.	40	
				Per 100 lbs. over 6,500 lbs.	50	
		Horsepower plus Lbs. Gross Weight.		*Tons Capacity.*		
West Virginia	Yes	Per h.p.	$0 30		*Solid Rubber*	
		Plus 30¢ per each 100 lbs. gross weight. (Passengers reckoned at 125 lbs. each, times seating capacity.)		1 ton or less	$25 00	2¢
				Over 1 ton to 2 tons	50 00	
				Over 2 tons to 3 tons	75 00	
				Over 3 tons to 4 tons	100 00	
				Over 4 tons to 5 tons	150 00	
				When equipped with pneumatic tires the fee is 25% less than for solid tires.		
				Tractors. *Gross Weight.*		
				2 tons or less	$20 00	
				Over 2 to 2½ tons	25 00	
				Over 2½ to 3 tons	30 00	
				Over 3 to 3½ tons	35 00	
				Over 3½ to 4 tons	40 00	
				Over 4 to 4½ tons	45 00	
				Over 4½ to 5 tons	50 00	
				Over 5 to 5½ tons	60 00	
				Over 5½ to 6 tons	70 00	
				Over 6 to 6½ tons	80 00	
				Over 6½ to 7 tons	90 00	
				Over 7 to 7½ tons	100 00	
				Over 7½ to 8 tons	110 00	
				Over 8 to 8½ tons	120 00	
				Over 8½ to 9 tons	130 00	
				Over 9 to 9½ tons	140 00	
				Over 9½ to 10 tons	160 00	
				Over 10 tons	180 00	
		Lbs. Weight.		*Tons Gross Weight.*		
Wisconsin	Yes	1,600 lbs. or less	$10 00	1½ tons or less	$10 00	X
		Over 1,600 to 1,800 lbs.	11 00	Over 1½ to 2¼ tons	15 00	
		Over 1,800 to 2,000 lbs.	12 00	Over 2¼ to 3 tons	20 00	
		Over 2,000 to 2,400 lbs.	13 00	Over 3 to 4 tons	30 00	
		Over 2,400 to 2,800 lbs.	14 00	Over 4 to 5 tons	45 00	
		Over 2,800 to 3,200 lbs.	16 00	Over 5 tons	45 00	
		Over 3,200 to 3,600 lbs.	18 00	Plus $5.00 for each ¼ ton or fraction thereof over 5 tons.		
		Over 3,600 to 4,000 lbs.	20 00			
		Over 4,000 to 4,500 lbs.	22 00			
		Over 4,500 to 5,000 lbs.	24 00	*Tractors.*		
		Over 5,000 lbs.	26 00	Same fee as for commercial cars.		
		If in operation 5 years or over 75% of above fees.				

State	Taxed as Personal Property	REGISTRATION TAXES				Gasoline Tax Per Gallon
		Passenger Cars		Commercial Cars		
		Horsepower.		*Tons Capacity.*		
Wyoming	Yes	22 h.p. or less	$8 00	1 ton or less	$15 00	1¢
		Over 22 to 30	12 00	Over 1 to 2 tons	30 00	
		Over 30 to 40	16 00			
		Over 40 h.p.	20 00	*Pneumatic Tires on Drive Wheels.*		
		Steam Propelled.		Over 2 tons to 3	$50 00	
		Same as passenger cars.		Over 3 tons to 4	75 00	
				Over 4 tons to 5	100 00	
		Electrically Driven.		Over 5 tons	150 00	
		Same as passenger cars.		Other than pneumatic tires on drive wheels, $10.00 extra.		
		Flat Rate.		*Flat Rate.*		
Dist. of Columbia	Yes	Gasoline cars, each	$1 00	Gasoline trucks each	$1 00	2¢
		Electrically Driven.		*Electrically Driven.*		
		Flat rate	$11 00	1st ½ ton of capacity	$20 00	
		Steam Propelled.		Each additional 1,000 lbs. or fraction	2 00	
		Flat rate	$15 00			

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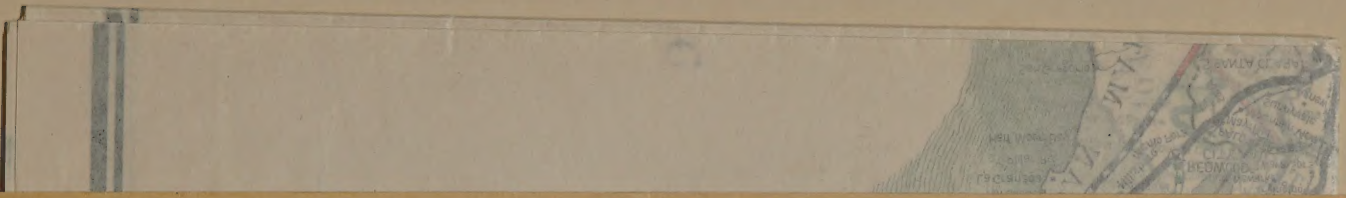
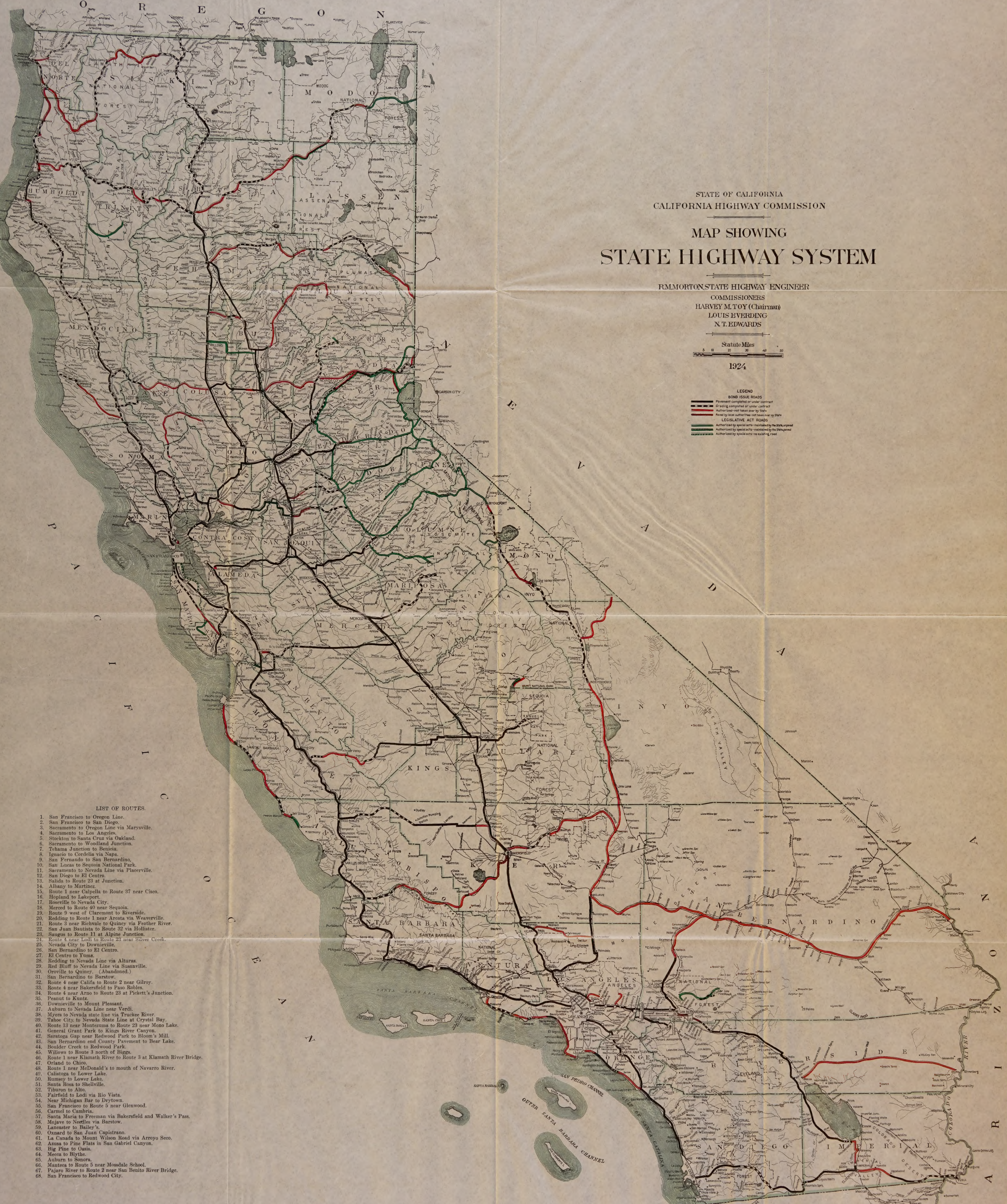


APPENDIX K.

Map showing State Highway System and status of construction June 30, 1924.

THE IMPROVED COLUMBIAN CLASP No. 75
PAT. JAN. 7, '19
THE UNITED STATES ENVELOPE CO., SPRINGFIELD, MASS.



STATE OF CALIFORNIA
CALIFORNIA HIGHWAY COMMISSION

MAP SHOWING
STATE HIGHWAY SYSTEM

R. M. MORTON, STATE HIGHWAY ENGINEER
COMMISSIONERS
HARVEY M. TOY (Chairman)
LOUIS EVERDING
N. T. EDWARDS

Statute Miles
5 10 20 30 40 50

1924

LEGEND
BOND ISSUE ROADS
Pavement completed or under contract
Grading completed or under contract
Authorized-not taken over by State
Paved by local authorities-not taken over by State
LEGISLATIVE ACT ROADS
Authorized by special acts-maintained by the State, unpaved
Authorized by special acts-maintained by the State, paved
Authorized by special acts-no existing road

LIST OF ROUTES.

1. San Francisco to Oregon Line.
2. San Francisco to San Diego.
3. Sacramento to Oregon Line via Marysville.
4. Sacramento to Los Angeles.
5. Stockton to Santa Cruz via Oakland.
6. Sacramento to Woodland Junction.
7. Tehama Junction to Benicia.
8. Ignacio to Cordelia via Napa.
9. San Fernando to San Bernardino.
10. San Lucas to Sequoia National Park.
11. Sacramento to Nevada Line via Placerville.
12. San Diego to El Centro.
13. Salida to Route 23 at Junction.
14. Albany to Martinez.
15. Route 1 near Calpella to Route 37 near Cisco.
16. Hopland to Lakeport.
17. Roseville to Nevada City.
18. Merced to Route 40 near Sequoia.
19. Route 9 west of Claremont to Riverside.
20. Redding to Route 1 near Arcata via Weaverville.
21. Route 3 near Richvale to Quincy via Feather River.
22. San Juan Bautista to Route 32 via Hollister.
23. Saugus to Route 11 at Alpine Junction.
24. Route 4 near Lodi to Route 23 near Silver Creek.
25. Nevada City to Downieville.
26. San Bernardino to El Centro.
27. El Centro to Yuma.
28. Redding to Nevada Line via Alturas.
29. Red Bluff to Nevada Line via Susanville.
30. Oroville to Quincy. (Abandoned.)
31. San Bernardino to Barstow.
32. Route 4 near Califa to Route 2 near Gilroy.
33. Route 4 near Bakersfield to Paso Robles.
34. Route 4 near Arno to Route 23 at Pickett's Junction.
35. Peanut to Kuntz.
36. Downieville to Mount Pleasant.
37. Auburn to Nevada Line near Verdi.
38. Myers to Nevada state line via Truckee River.
39. Tahoe City to Nevada State Line at Crystal Bay.
40. Route 13 near Montezuma to Route 23 near Mono Lake.
41. General Grant Park to Kings River Canyon.
42. Saratoga Gap near Redwood Park to Bloom's Mill.
43. San Bernardino end County Pavement to Bear Lake.
44. Boulder Creek to Redwood Park.
45. Willows to Route 3 north of Biggs.
46. Route 1 near Klamath River to Route 3 at Klamath River Bridge.
47. Orland to Chico.
48. Route 1 near McDonald's to mouth of Navarro River.
49. Calistoga to Lower Lake.
50. Rumsey to Lower Lake.
51. Santa Rosa to Shellville.
52. Tiburon to Alto.
53. Fairfield to Lodi via Rio Vista.
54. Near Michigan Bar to Drytown.
55. San Francisco to Route 5 near Glenwood.
56. Carmel to Cambria.
57. Santa Maria to Freeman via Bakersfield and Walker's Pass.
58. Mojave to Needles via Barstow.
59. Lancaster to Bailey's.
60. Oxnard to San Juan Capistrano.
61. La Canada to Mount Wilson Road via Arroyo Seco.
62. Azusa to Pine Flats in San Gabriel Canyon.
63. Big Pine to Oasis.
64. Mecca to Blythe.
65. Auburn to Sonora.
66. Manteca to Route 5 near Mossdale School.
67. Pajaro River to Route 2 near San Benito River Bridge.
68. San Francisco to Redwood City.